# TECHNICAL BULLETIN

IN HONOUR OF THE

Twenty-Fourth Anniversary

OF THE

FOUNDING OF THE
CORPS OF ROYAL CANADIAN
ELECTRICAL AND MECHANICAL
ENGINEERS

VOLUME 13 NUMBER 2

JUN 68

# RCEME TECHNICAL BULLETIN

THIS TECHNICAL BULLETIN IS PUBLISHED BY AUTHORITY OF COLONEL A.L. MACLEAN, CD, HEAD OF THE CORPS OF RCEME AND COMMANDANT, THE RCEME SCHOOL, WHO HAS APPROVED THE CONTENTS FOR PUBLICATION.

THE BULLETIN IS PUBLISHED TO ASSIST RCEME PERSONNEL IN KEEPING ABREAST OF CURRENT TRENDS IN DEVELOPMENTS AND TO CIRCULATE NEWS OF THE CORPS AND INDIVIDUAL ACTIVITIES AND TO PROVIDE A FORUM FOR DISCUSSION AND THE EXCHANGE OF IDEAS BY MEMBERS OF THE CORPS.

THE INFORMATION AND STATEMENTS HEREIN DO NOT NECESSARILY REPRESENT OFFICIAL POLICY AND ARE NOT TO BE QUOTED AS AUTHORITY FOR ACTION.


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RCEME SCHOOL
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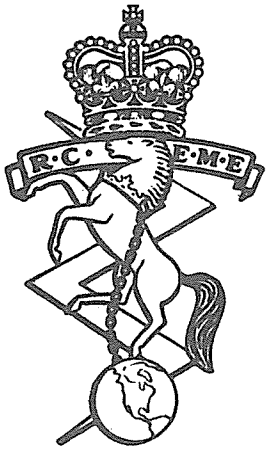
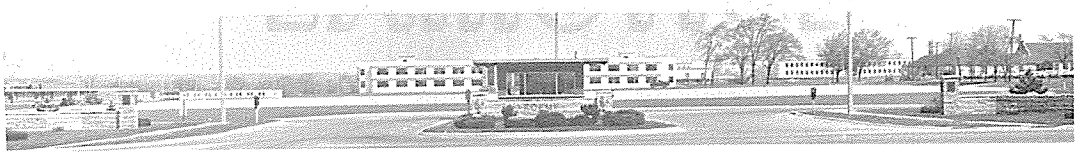
KINGSTON, Ontario

THE MAIN ENTRANCE TO THE RCEME SCHOOL



McNAUGHTON BARRACKS KINGSTON, ONT.

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# EDITORIAL

Traditionally much of this issue is devoted to the celebrations of the founding of our Corps. We have not yet received any accounts of activities at outlying units, but we expect to do so in time for the next edition. Because of this and because the celebrations at the School were enhanced by the re-dedication of the completed memorial gates, this forms the focal point of this issue.

Production of satisfactory coverage of an event like this rededication involves a great deal of work not obvious to the ordinary reader.Major WRL Springford and others were actively engaged for quite some time seeking information on previous gates at the School. This resulted in his article but time did not enable us to research any other gate stories that may exist. We would, therefore, welcome any inform - ation that readers may have including photographs. These - anecdotes need not be confined to School Gates only.

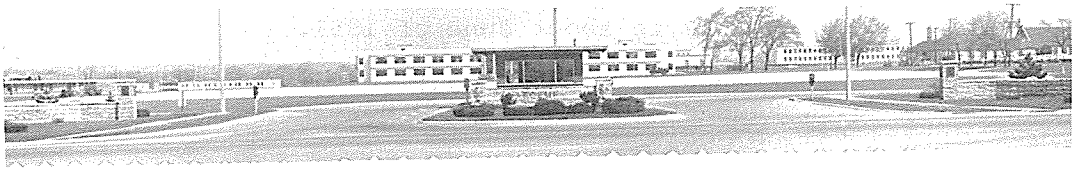
Photographing the new gates was a major problem.CAPT EA Argue and Warrant Officer AR Slaughter attempted various angles and shots but it proved impossible to get a really good photograph encompassing the whole layout.As a last resort, Mahood's Drug Store in Kingston, very kindly loaned WO Slaughter a fish eye lens but, unfortunately, this did not produce the result desired. In the end, we had to settle for the three separate shots shown on the cover so that readers could see the lettering and the crests.

CPL RM Koshowski of the School Training Aids Section came to our rescue and produced the original of the sketch on page 2.We would like to extend our thanks to him and WO RB Saunders and the Training Aids Section of the Staff College for the other art work in this and other editions.

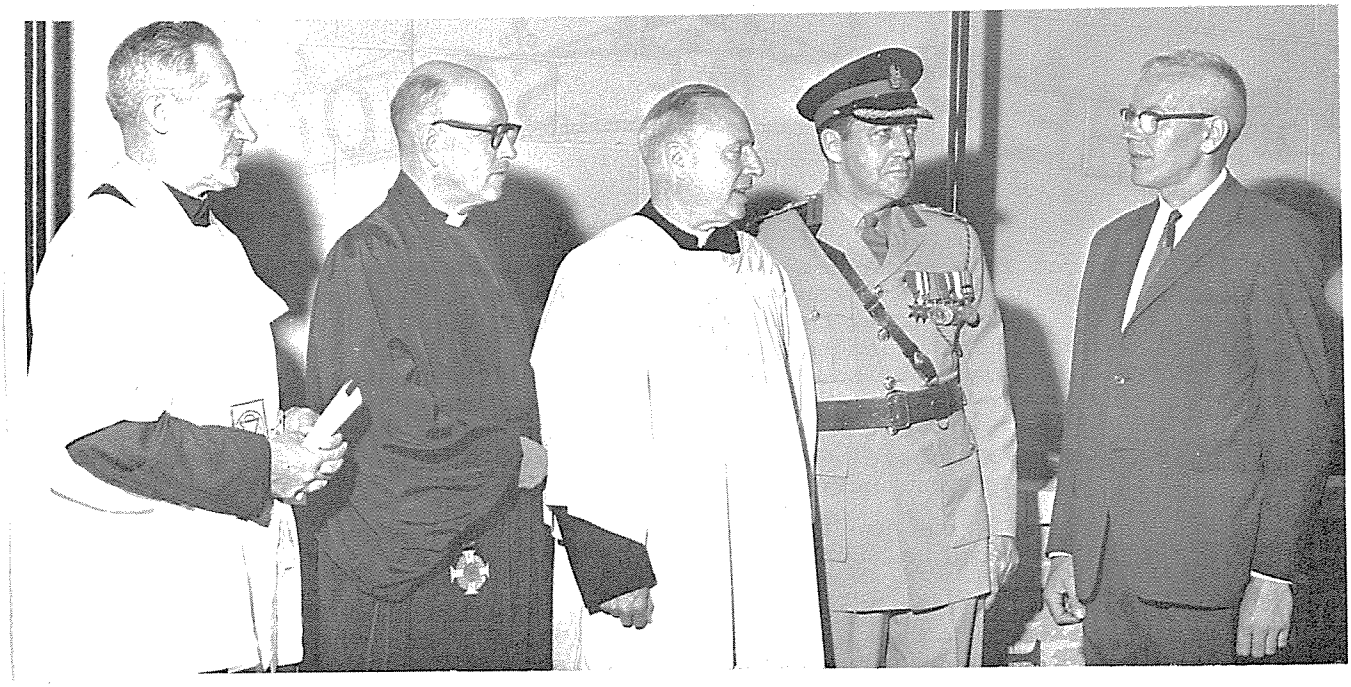
This issue also includes the first article of our exchange programme with "Craftsman", The Journal of REME.This was written by COL JD Kelly and provides an insight into some of the problems associated with rapid movement of a large force.Some readers may remember COL Kelly when he was CREME of the Division with which 4 CIBG was associated in Germany.

We were unable to credit the author of the article "Packaging and Documentation"because he did not include his name.Prospective authors who wish to receive credit in print should ensure they include their names with their article.

# REDEDICATION



## THE RCEME MEMORIAL GATES



**Father JJML Marsolais CD (MAJ), Rev JKL Howson CD (MAJ), The Very Rev JA Sweeney VF, Colonel AL Maclean CD, and L COL TE Duffield CD (President of the RCEME Corps Association)**

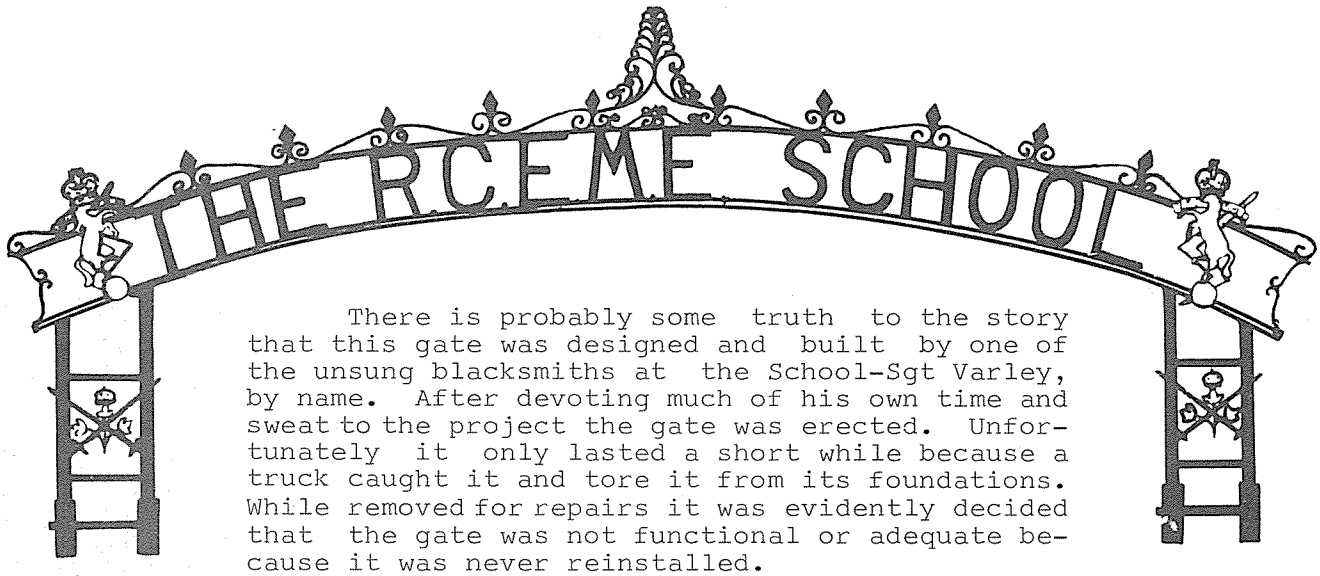
When an event such as the rededication of the RCEME Memorial Gates takes place, it is natural to wonder what might have preceded our present gates. Many of the facts concerning earlier gates and attempts at gates are lost in the mists of memory. A few facts and anecdotes have been discovered however.

In July of 1950 a competition was announced in The RCEME Quarterly. Because a NEW SCHOOL was to be built, imminently, it was considered intolerable that no gate - ornamental or useful - existed. All could be artists and draughtsmen were invited to bend to their drawing boards and produce a design for a suitable gate. To increase the ardour of the contestants, a prize of $25.00 was offered. (18 years ago a person could still have a good party on $25.00)

The specifications for the gate were that it be 18 feet long, eight feet high and made of wrought iron.

Some entries were received in the contest and submitted for judging to Professor H.H. Madill of the University of Toronto. Presumably, none of the contestants were sufficiently fired by the $25.00 prize, because none of the submissions were considered worthy of the prize. All submissions were returned to the contestents, with more complete specifications, in an attempt to obtain an acceptable design. This was in about June of 1951.

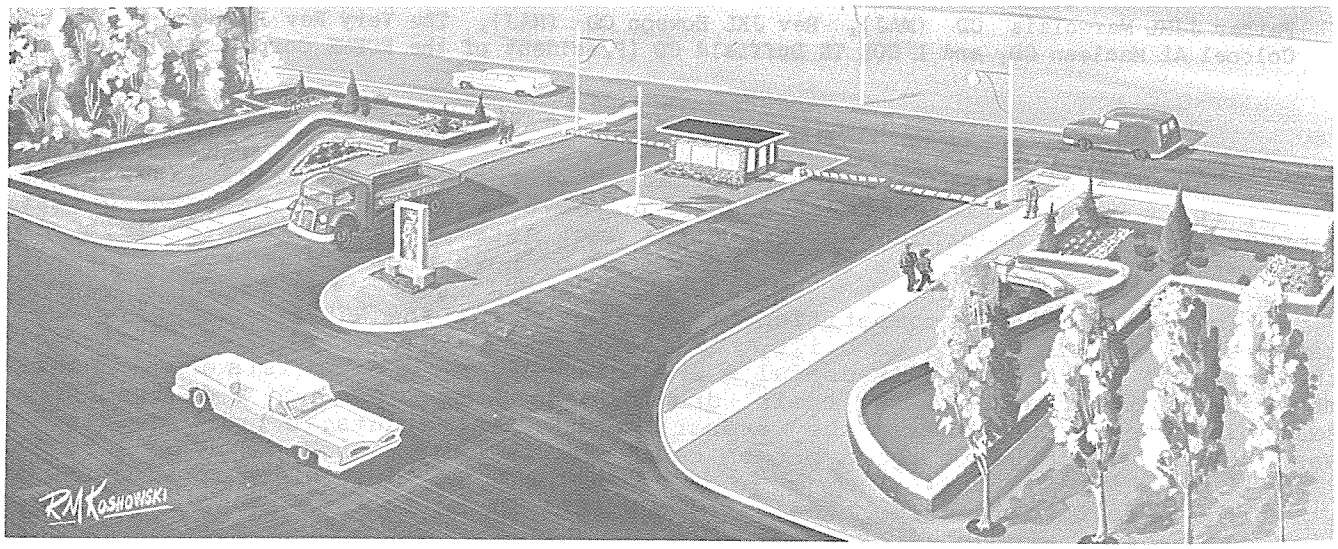
At this stage the picture clouds somewhat and we find that the gate shown below was drawn by "S.F. Rogers" in Nov 1951. However it is not known whether his was the winning design or whether it was a composite made up of the good points of several submissions.




There is probably some truth to the story that this gate was designed and built by one of the unsung blacksmiths at the School-Sgt Varley, by name. After devoting much of his own time and sweat to the project the gate was erected. Unfortunately it only lasted a short while because a truck caught it and tore it from its foundations. While removed for repairs it was evidently decided that the gate was not functional or adequate because it was never reinstalled.

At any rate, we come now to the present Gates which have been completely erected, unveiled, dedicated and which are definitely sufficiently solid to remain for many years.

The idea of these gates was conceived by the RCEME Corps Association in 1961. An artists sketch of the proposed gates is shown below.



"On either side of the Entrance is a formal arrangement of shrubs, plants, bushes, and trees. This arrangement is backed by a three to four foot privet hedge and the front portion consists of a low barbery hedge in part with the remainder a dwarf privet hedge. The interior is filled with junipers, foliage, shrubs, dwarf pines, roses, flowering bushes, and ornamental imported trees. Inset in the centre portion of the arrangement is a triangular floral plot with a stone pier and wing wall as a base. The pier has a bronze Memorial plaque which indicates that the Entrance is dedicated to THE MEMORY OF THE OFFICERS AND MEN OF THE RCEME CORPS WHO HAVE GIVEN THEIR LIVES IN THE SERVICE OF THEIR COUNTRY. The centre portion which divides the road way is a grassed area. The Gatehouse is located here and sits on a brick foundation with artistically placed shrubs at its base."

The Corps Association worked hard canvassing for funds ($5,000) to erect this gate and bit by bit the money came in, from individuals serving and retired, and from units - regular and militia. In October 1961 the gates were unveiled by the late General The Honourable A.G.L. MacNaughton PC, CH, CB, CMG, DSO,CD, at the time the Honorary Colonel Commandant of the Corps.

The completed gates as they now appear, are shown in the photograph above the title to this article. They are quite close in appearance to the artists sketch.The primary difference is the removal of the illuminated case containing the Corps Crest and its replacement with the lettering and Corps crests in bronze relief on the Gates themselves.

This improvement to the Gates was the primary reason for the rededication of them. This was a very artistic improvement to the Gates and thanks are due to the Corps Association for its lively interest in the Corps.

The Memorial Gates as they stand are a handsome, well-built and proud Memorial to those of our Corps " WHO HAVE DIED IN THE SERVICE OF CANADA "

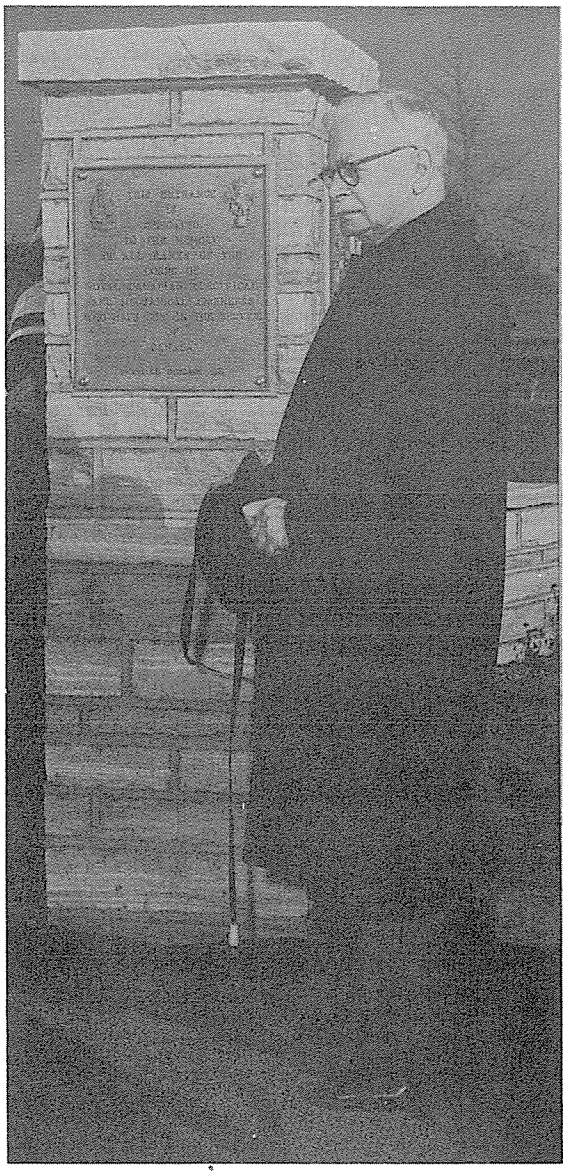


Photo of the late → → →
General The Honorable

AGL MacNaughton

at the unveiling of the

MEMORIAL GATES

at RCEME School, Oct 61
Reprinted from RCEME Technical
Bulletin Vol 9 Number 2
Apr 64

# 24TH ANNIVERSARY OF THE FOUNDING OF THE CORPS OF R.C.E.M.E.

By
MAJOR W.R.L. SPRINGFORD

This year the RCEME Birthday was celebrated on the Weekend of the 11th and 12th of May in order to permit a large number of RCEME Militia and RCEME Corps Association members to attend. Militia units from all parts of Ontario and Quebec were represented at the School on the weekend, and only difficulties in transportation kept units in more remote locations from attending.

On Saturday, 11 May, an inspection of the troops in the School was carried out by BGEN A.G. Chubb DSO, CD. After taking the salute on the march past BGEN Chubb took the opportunity to recall the founding of the Corps from his point of view. He had been in the Lord Strathcona 's Horse at the time. He claimed that in 1944 all the Armoured Corps personnel who could read and write were remustered voluntarily or otherwise, into the newborn Corps. However BGEN Chubb went on to say that having started with the cream of the Army, he was pleased to see that the Corps was maintaining an excellent standard.

Later, in the afternoon, the various trades companies of the School and the Corps Museum were open for visitors and dependents.

In the evening the various messes had their parties. BGEN Chubb and Colonel Maclean visited each of the messes in turn, to take part in the cake cutting.

On Sunday 12 May, unfortunately the fine weather from the previous day did not hold, and the functions had to be moved into the Drill Hall. However the Drumhead Service and rededication of the **Memorial Gates** went off just as planned and were extremely well attended. Approximately 200 visitors and dependents watched the ceremonies.

Padres Howson and Marsolais of the RCEME School conducted the Drumhead service on the piled drums of the Drums and Bugles of the RCEME School. The lesson was read by LCOL T.E. Duffield CD, President of the Corps Association.

The Very Reverend J.A. Sweeney VF, Dean of Niagara rededicated the Corps of RCEME Memorial Gates. Father Sweeney was one of the chaplains attached to a RCEME Workshop during WW II.

Included in the service was this prayer written by a padre with a RCEME unit in France during WW II. It is recalled here as evoking concisely and simply the spirit in which the Corps approaches its services.

> "God of power and might, whose all - pervading energy is the strength of nature and man; inspire, we pray Thee, Thy servants of The Corps of Royal Canadian Electrical and Mechanical Engineers with the quickening spirit of good will, that as honest craftsmen, seeking only the good of all in peace or war, we may glorify Thee both in the work of our hands and the example of our fellowship, through Jesus Christ our Lord.
>
> Amen"

Even though the name of our Corps will soon become history, the feeling of fellowship that was obvious throughout this weekend makes it apparent that the Corps of RCEME will continue on in spirit for years to come.

# PARADE AND INSPECTION

INSPECTING OFFICER

## BRIGADIER GENERAL A.G. CHUBB DSO, CD

Commandant:
Colonel A.L. Maclean, CD

Second-in-Command:
Lieutenant Colonel E.B. Creber, CD

PERSONNEL OFFICER
Lieutenant C.N. Sochasky, CD

Regimental Sergeant-Major:
RSM (CWO) D.N. Campbell, CD

No. 1 Company
Major A.J. MacGillivray, CD
Captain G.E. Maguire
Captain W.W. Laird, CD
Lieutenant R.P. Kudar
Lieutenant J.S. Holt, CD

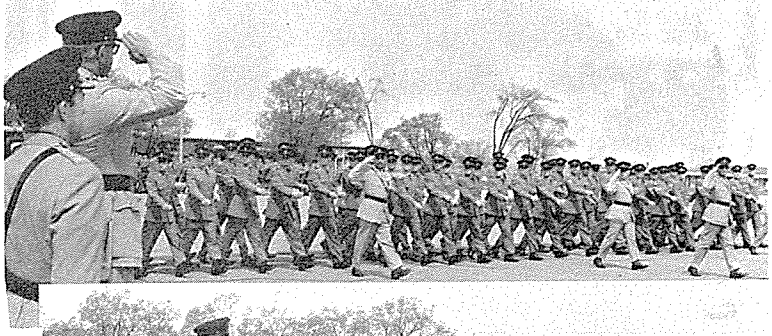
No. 2 Company
Major R.D.L. Connell, CD
Captain D.M. Langley, CD
Captain J. Spackman, CD
Lieutenant D.D. Dorman
CWO J. Szumlanski, CD

No. 3 Company
Major R. Peters, CD
Captain E.A. Argue, CD
Captain W.D. Roche, CD
Lieutenant J.H.R.Y. Girard
Lieutenant A.B. Fuller, CD

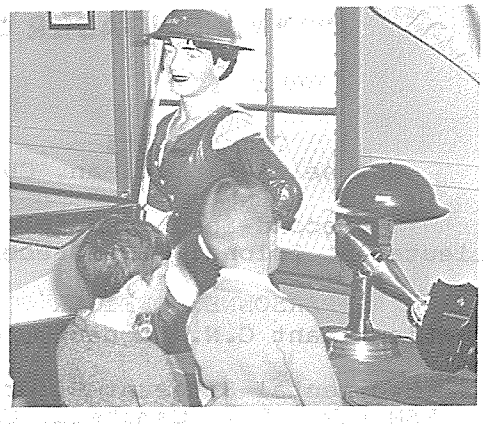
No. 4 Company
Captain H.J. Hellard, CD
Captain H.N.P. Quick, CD
Captain L.A. Leflar
Lieutenant J.M. Lafleur, CD
Lieutenant B.P. Brown

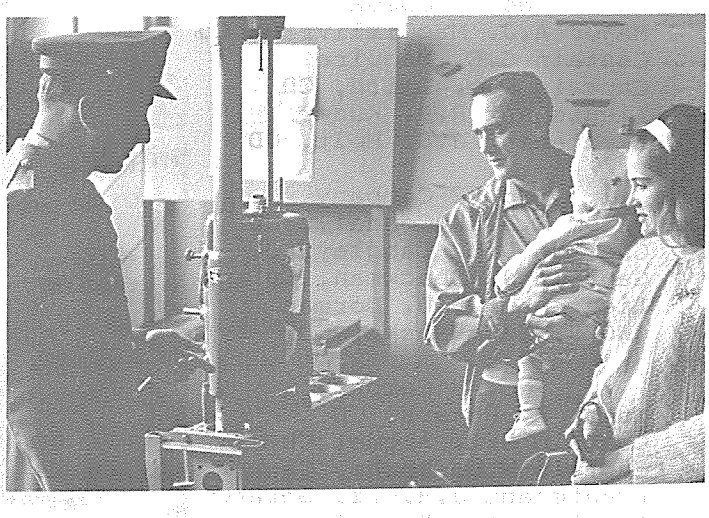
DRUMS AND BUGLES

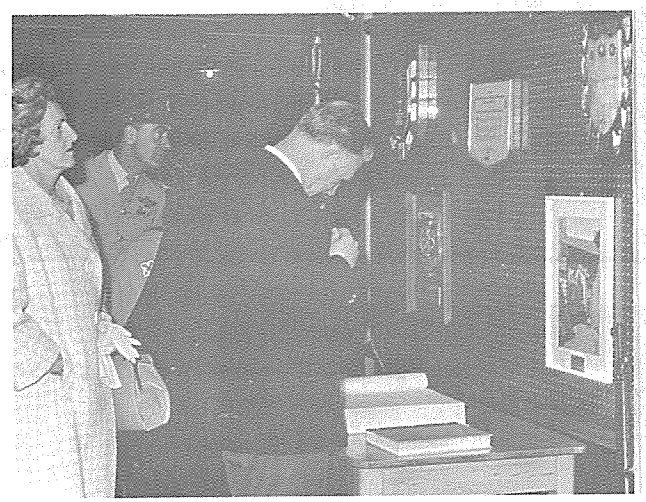
Directed By MWO Monkman W.W., CD

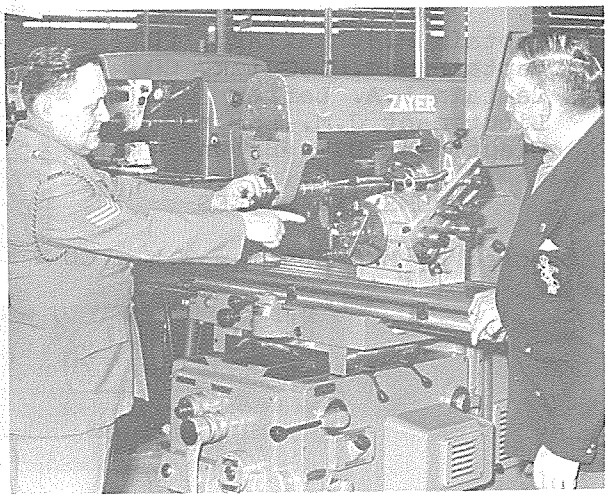


# VISITORS DAY 12 MAY 1968









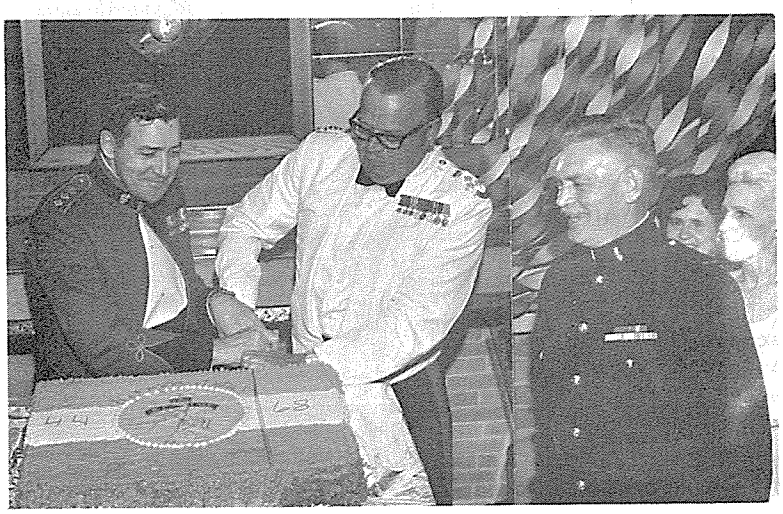
# celebrations

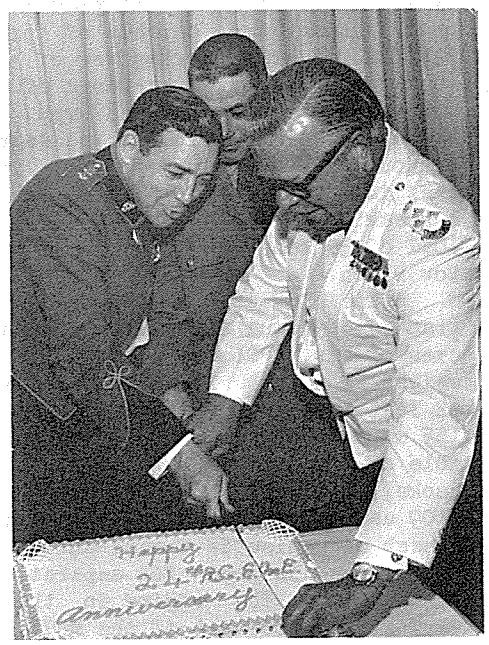
FM CANFORCE HEADQUARTERS UNCLAS DC528

FOR COMMANDANT RCEME SCHOOL, OFFICERS, NON-COMMISSIONED OFFICERS AND MEN OF THE CORPS OF ROYAL CANADIAN ELECTRICAL AND MECHANICAL ENGINEERS FROM MINISTER OF NATIONAL DEFENCE. MY VERY BEST WISHES TO YOU ON THE OCCASION OF THE ANNIVERSARY OF YOUR CORPS, 15 MAY.

**The Trinity Chapel Junior Choir**

**Under the direction of Mrs. Margaret Edna Sochasky at the Rededication Service and Annual Drum Head Service.**





Cake Cutting By
Brigadier General AG Chubb DSO, CD
and Colonel AL Maclean CD

# TECHNICAL NOTES

BY LT RP KUDAR

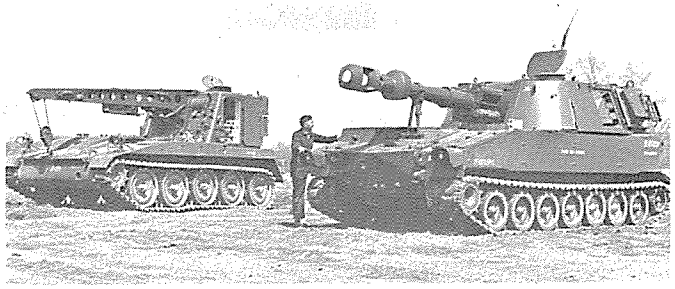
NEW ADDITIONS

Two new pieces of equipment have arrived at the RCEME School. These are the M578 Recovery Vehicle and the M109 Self-propelled howitzer.

To aquaint RCEME tradesmen with the characteristics and maintenance responsibilities on the M109, a special three week course commencing on 15 May 68 will be held at Vehicle Company. This course will be conducted by instructors from the United States Army. All subsequent courses on the M109 and the M578 willbe conducted by personnel at the RCEME School. Current plans call for eight such courses during the next training year.Each course will have twelve candidates and will consist of four weeks of instruction made up of three weeks on the M109 and one week on the M578.

First the M578 Recovery Vehicle. It is an armoured, light, fully tracked vehicle. It requires a crew of three. The vehicle weighs 27 tons fully equipped or 23.5 tons when prepared for air transport. It is almost 11 feet tall and 21 feet long. The engine is a GM V8 turbocharged two cycle diesel with a displacement of 564 cubic inches and capable of producing a maximum net brake horsepower of 350 hp.The vehicle has a cruising range of 450 miles and the maximum speed is 37 mph. The boom is capable of traversing 360 degrees continuous. The boom winch cable is 5/8 inches in diameter and 350 feet long. It has a breaking strength of 16.6 tons. A towed load of 30 tons can be handled with the tow winch.

The M109 is a self-propelled, fully tracked, medium howitzer. It carries a crew of six. Combat loaded, the vehicle weighs 26 tons. It is ten feet tall, and 22 feet long. The primary armament is a 155 mm howitzer cannon.The weapon is capable of firing high explosive, anti-tank, smoke, chemicals, and nuclear shells. The M109 carries 28 rounds of ammunition. The breech mechanism is a semi-automatic screw block type designed for separate loading ammunition. The engine in the M109 is very similar to that of the M578. It is a G.M. liquid-cooled, V-8 diesel with a displacement of 568 cubic inches producing 345 horsepower at 2,300 rpm. The vehicle has a cruising range of 220 miles and the maximum speed is 35 mph.



# WHAT IS IN A ROCKET

By Major D.R. Burls, B. Eng., A.M.I.Mech. E., A.M.B.I.M., gw, REME

Printed with permission from The Royal Electrical and Mechanical Engineers. No.18 February 1968

## INTRODUCTION

We live in a Space Age, thanks to technological development of that very old device, the rocket.

## WHAT IS A ROCKET?

Most propulsion devices operate under Newton's third law of motion - the one about action and reaction-by pushing or pulling against something else. As in the case of the rowing boat, it is unnecessary to push against something stationary. In fact, the object pushed against can be part of the original. A swimmer who pushes himself away from a ball gives himself and the ball velocities in opposite directions, of magnitudes dependent on the relative masses of himself and the ball, and the violence with which he throws it. So with a rocket, which expels as violently as possible part of itself, producing a thrust and giving itself velocity.

To produce a steady thrust, this expulsion must be continuous and although the matter expelled could be discrete particles, it is more convenient to use a fluid. In order to be expelled this working fluid must acquire velocity, and must therefore first acquire energy. This primary energy has to be converted to kinetic energy.

The essentials are therefore a supply of working fluid, a source of primary energy and a means of converting it to kinetic energy. The rocket has two important properties making space travel possible- motion derived independently of any external agency and its own supplies of energy and working fluid.

## AIR BREATHING ENGINES

Note the difference between rockets and jet engines, for while both produce forward thrust, and hence velocity, by the rearward ejection of a working fluid, the jet engine obtains most of its working fluid and part of its primary energy, by taking in air. This air breathing engine can operate only where there is air and could have a part to play in space travel, being used during the early part of a launching. The rocket on the other hand, carries all its working fluid and primary energy.

## PRACTICAL SYSTEMS

A rocket is not necessarily a heat engine, but heat is a convenient form of primary energy. It can be obtained from a chemical reaction, which should also normally produce a suitable working fluid. These properties do not always go together, for example, aluminum burning in oxygen produces intense heat, but the product, aluminum oxide, is useless as a working fluid.

The chemical reaction is usually called combustion and the chemicals are called the fuel and oxidant. The fuel may not however be recognizable as such and oxygen may not be present.

## PROPELLANTS

The "rocket fuel" of popular scientific literature is only half the story - the oxidant is often the more important in determining performance, and the chemicals are best referred to as the propellants, being broadly classified as solid or liquid.

It is possible to predict the performance of propellant combinations from a knowledge of the chemistry of the reaction. The number of suitable combinations is really quite limited, a compromise being necessary between the violence of the reaction (i.e. the amount of energy released), the resulting working fluid and the ease of handling the propellants. Understandably, the chemicals producing the most energy tend to be those requiring the greatest care.

Liquid Propellants

Some of the most effective propellants (usually oxidants and in particular oxygen) are gases in their normal state. This is not an efficient way of carrying them in a rocket and they are therefore liquefied, and are known as cryogenic propellants. Although they afford a high specific impulse the technical problems in handling them, together with their limited in-rocket storage time, means they are not really suitable for military purposes. Other propellants which are not cryogenic and which may be kept in the rocket for long periods are called storeable, a property depending on the compatibility of propellant and rocket materials, i.e., the extent to which corrosion, perishing and adulteration will take place.

Some liquids under certain conditions break down by internal chemical reaction, creating the necessary heat and suitable products of combustion. They are called mono-propellants and are really fuel and oxidant combined.

Liquid Rockets

Most liquid rockets are a bi-propellant system, i.e., the fuel and oxidant are stored in separate tanks from which they are fed into a combustion chamber and there ignited and burnt continuously. Certain propellant combinations (called hypergolic) have the useful property of igniting spontaneously on mixing. A system is sometimes used in which the main propellants are ignited by the prior introduction of a small quantity of a hypergolic combination. The propellants must be forced into the chamber against the combustion chamber pressure. This is done by pressurizing the tanks (pressure-fed) or by pumping (pump-fed).

For rockets with a given thrust, the dead weight of the thrust unit is constant, while that of the tankage depends upon the amount of propellant, i.e., the range. In a pressure fed rocket the tankage must withstand a pressure higher than the chamber pressure. The tanks will therefore be heavier than those of a pump fed rocket. For short ranges, the pressure fed rocket scores by eliminating the pump weight. Otherwise, the large rise in tank weight required for pressure feed favours the pump fed rocket.

Thrust Control and Thrust Vectoring

In a motor car the power output is controlled by throttling the rate at which fuel is used. Similarly, the thrust of a rocket motor, but only in the case of liquid propellants, may be varied by adjusting the rate of propellant usage. This thrust control is important in the guidance of rockets.

Thrust vectoring as a means of controlling and guiding a rocket is relatively simple to achieve in a liquid rocket, by swinging the combustion chamber and nozzle.

Solid Propellants

In this case the fuel and oxidant are if necessary bound together with a suitable medium to produce a solid lump, which may be hard, plastic or rubbery. This lump, called the grain, can be stored and merely requires ignition.

Solid Rockets

The motor case of a solid rocket must withstand the pressure within, leading to a heavier structure than with a pump fed liquid rocket. This may be offset by the avoidance of a liquid propellant feed system, and of a combustion chamber, since combustion is at the surface of the grain. Although reliable techniques for thrust vectoring the solid rocket have been developed, its thrust cannot be controlled as in the liquid rocket. However-particularly in the case of weapons-it has the advantages of storeability, reliability and ease of handling. Solid propellants produce less specific impulse than may be generally obtained from liquid propellants.

## SPECIFIC IMPULSE

The suitability of a given propellant combination depends on several things-the heat of the reaction and the physical proper-

ties of the products of combustion being perhaps the most important. Several "factors of goodness" have been suggested and are used, but the most useful, and the most common, is called the specific impulse. This indicates the available exhaust velocity of the gas and is the thrust developed for a propellant usage rate of one pound per second, having the dimension of time.

It is important to realize that this expression of specific impulse assumes complete energy conversion. In practice, the specific impulse will always be less than this and will depend on the rocket's operating conditions. These should always be stated when quoting a specific impulse. Nevertheless, the ideal or theoretical specific impulse affords a good measure of relative performance of propellants. Some typical specific impulses are shown in the Table.

| Rocket Type | Specific Impulse In Seconds |
|---|---|
| Electric | Up to 10,000 |
| Nuclear gas | 800 -- 1,000 |
| Tri-propellant | 500 -- 600 |
| Cryogenic liquid | 300 -- 400 |
| Storeable liquid | 250 -- 320 |
| Solid | 220 -- 280 |
| High density liquid | 200 250 |

## THE NOZZLE

The gas passes out of the chamber through a nozzle, and the volume which it occupies rapidly increases as the gas expands. At the same time the velocity increases and the pressure drops, and when down to the outside pressure, maximum conversion of heat to kinetic energy has occurred. The gas is then said to be correctly expanded. The nozzle is convergent-divergent in shape and without discussing the reason for this it should be noted that because of its divergence, the physical size and weight increases as the nozzle length is increased.

The pressure outside the rocket changes from one atmosphere at sea level to practically zero in space. A nozzle that expands gas correctly at sea level will expand it down to 14.7 lbs. per square inch at all altitudes. Thus it will not produce the full effect available in space and the gas would be under-expanded. This loss of available energy equates to a reduction in specific impulse and hence of thrust.

Conversely, a very large nozzle designed to expand from a given chamber pressure almost down to zero, i.e., designed for maximum energy conversion in space would, if used at sea level, expand the gas to below atmosphere pressure, creating a vacuum at the end of the nozzle. This results in a loss of thrust and of specific impulse. A serious effect is that the rocket is liable to run unevenly in this condition of over-expansion. Clearly, it is not possible to secure maximum efficiency at all altitudes with a single, fixed shaped nozzle. To expand the gas to zero pressure, an infinitely large nozzle would be needed. In practice expansion is limited to keep down the weight and size of the nozzle.

The specific impulse obtained from a given propellant combination when used in a rocket operating in space and designed for correct expansion in space (i.e. vacuum conditions) is called the vacuum specific impulse of the propellants. Similarly the sea level specific impulse would be obtained when fulfilling correct expansion conditions at sea level. The sea level specific impulse is always ten to fifteen percent less than the vacuum specific impulse, different nozzles being required in each case.

It must be emphasized that it is the act of ejecting working fluid which produces rocket thrust, not the reaction upon any outside air. On the contrary, the presence of outside air prevents the most efficient working of the rocket.

## ALTERNATIVE SYSTEMS

There are alternatives to the chemical rocket. One possibility is to use a different heat source - the nuclear reactor is an obvious candidate. Another is to use a different form of primary energy-electricity is useful in certain applications.

### Nuclear Gas Rocket

In the nuclear gas rocket, the heat is derived from a nuclear reaction. There are no combustion products and so working fluid must be provided, with the resulting advantage that it may be selected for its most suitable physical properties. At the high operating temperatures used this would be a gas - hence the term nuclear gas rocket. Hydrogen is the most favoured, but ammonia is a possible substitute. The heat is transferred to the gas (stored within the rocket in liquid form) by using it as a coolant circulating round the nuclear pile. The amount of heat that can be absorbed by the gas is limited by the maximum allowable temperature in the pile and by efficiency of the heat exchanger, factors depending on the current engineering state of the art.

The heat is converted into kinetic energy in a nozzle, as in the chemical rocket. The concept of specific impulse may be applied to nuclear gas rockets and a typical figure is given in the Table. In comparing the specific impulse of chemical and nuclear gas rockets remember that for chemical rockets the usable energy is an inherent property of the propellants. For nuclear gas rockets energy is supplied externally and is limited only by heat exchanger design and high temperature metallurgy. The high specific impulse of the nuclear gas rocket is offset by certain disadvantages, including the considerable weight of the nuclear reactor and the need for radiation screening, particularly in the case of manned flight.

### Electric Rockets

It is possible to use stored or generated electricity as the primary energy, but a very high voltage is necessary. The working fluid is a stream of electrical particles which are accelerated violently by electrostatic or electromagnetic means. A very high velocity is achieved, resulting in efficient use of the working fluid. Because the mass of each particle is minute, the overall mass flow is tiny and the resulting thrust very low, perhaps no more than 20 grammes. Very high figures of specific impulse are obtainable, with the effectiveness, of the device dependent on the extent to which engineering problems are solved. Unsuitable in the presence of gravity, such rockets could be very useful in space travel.

## ROCKET VEHICLE

A rocket vehicle comprises three main items - the working fluid (in effect the propellants), the rocket structure and the payload. The structure is all the dead weight of the rocket necessary to ensure its operation and includes tanks, pumps, nozzle and combustion chamber or nuclear reactor and heat exchanger. Each of these three items will affect rocket performance. The payload is the useful load carried and could be an earth satellite or a warhead.

Thrust is produced only during expulsion of working fluid and when that ceases rocket action will cease, even though, in the case of the nuclear rocket, there may be excess primary energy left. Thus the greater the proportion of working fluid the more effective is the rocket vehicle.

## STRUCTURE FACTOR

The payload is not part of the rocket, which itself consists of the working fluid and the structure, and so a good measure of effectiveness is the amount of working fluid in relation to the structure weight. The structure factor is defined as the proportion of the rocket weight (excluding payload) which is rocket structure. A typical figure is 10 percent although for actual designs it may vary considerably. This factor indicates the quality of the rocket design; the lower the factor the better the design.

## MASS RATIO

The measure of effectiveness of a

rocket with a payload becomes the fraction of total rocket weight, including payload, which is not working fluid. The reciprocal of the fraction, called the mass ratio, is the ratio of the total initial weight of the rocket vehicle, to the final weight. It is always greater than unity and can never exceed the reciprocal of the structure factor - this would be the mass ratio for zero payload. Thus, the mass ratio of a rocket with a structure factor of 10 percent can never be greater than 10 and can equal 10 only when there is no payload.

One further useful concept is the ratio of the all up or total initial weight to the payload. This, known as the payload mass fraction, will be greater than the mass ratio.

## ACCELERATION AND VELOCITY

The thrust of the rocket is the product of the specific impulse and the mass flow. If both remain constant, the thrust will remain constant. The mass of the rocket is, however, reducing as the rocket action continues, because of the continuous loss of the working fluid. The constant thrust acting on a reducing mass results in an increasing acceleration, normally at the maximum at shut down. This maximum acceleration is a major design consideration because a high figure calls for a robust, and therefore heavy, rocket structure. The rocket's final velocity is determined by the specific impulse and the mass ratio, and if insufficient for the required mission, it will be necessary to resort to staging.

## STAGING

Staging means combining two or more rockets, such that the second rocket takes over after shut down of the first and so on. The structure of the preceding rocket, being dead weight, is discarded when the next rocket, or stage as it is called, is lit. The payload is carried by the final stage. The advantages of staging are:

a. The total velocity attainable, being the sum of the velocities of each stage, is greater than that attainable by any stage alone.

b. As each stage burns out, its now useless structure can be discarded.

c. Each stage can be designed for maximum efficiency. For example, the first stage can be designed for atmospheric operation and subsequent stages for vacuum operation.

d. The mass ratio of each stage being lower than that of the complete rocket, there will be a better (i.e., smaller) ratio of all up weight to payload.

e. The final acceleration of each stage is low, enabling a lighter structure to be used, allowing an increase in payload.

The principal disadvantage of staging is complexity, particularly the problems of lighting the second and subsequent stages.

There are different ways of arranging stages, referred to as the configuration. The way in which the stages are used is called the operation. There are two main classes in each of these.

Parallel configuration of stages means that two stages (it is most unlikely there will be more) are located side-by-side. Parallel operation means that they function at the same time.

Tandem configuration means the stages are located on top of each other. Tandem operation means that stages operate in sequence, one stage being lit when the previous stage is shut down.

Should a rocket have more than two stages it may employ combinations of these arrangements. For example, it would be possible to have the first two stages in parallel, both configuration and operation, and a tandem third stage, both in configuration and operation. Any combination is possible with the exception of tandem configuration with parallel operation.

In one other system, some part of the

rocket is discarded after it has served a useful purpose. This reduces the structure weight. For example, if the propellants of a liquid rocket are carried in several separate tanks, they could be discarded as they are emptied. Alternatively, the rocket could have several thrust units (i.e., combustion chambers and nozzles) fed from the same tanks. When the rocket is clear of the atmosphere or when the weight has reduced sufficiently, one or more of the thrust units may be discarded, as in the US Atlas rocket. This process is called partial staging, since only part of a stage, not a complete rocket, is discarded.

Staging Techniques

When a second, or subsequent stage of a liquid rocket is being accelerated during the first stage operation, its propellants are pushed by the acceleration towards the bottoms of the tanks, like the passengers in a car being pushed back in their seats when accelerated. At shut down of the stage acceleration ceases, the rocket is now in a stage of weightlessness and there is nothing to keep the second stage tank bottoms completely full of propellants. The pumps may be unable to suck in propellants for the second stage engine to start. To overcome this difficulty the propellants must be pushed into the tank bottoms. One method of doing this is to push the propellants down with a piston or an inflatable diaphragm. A simpler method is to ignite small solid rockets giving sufficient thrust to the main rocket body to settle the propellants.

Alternatively, an overlap in the operation of the stages can be arranged. Though not as easy as it sounds, techniques have been developed to achieve this. Solid propellants do not require settling and weightless light up presents no problems.

Separation

When all the stages have finished burning, it is necessary to separate the payload from the remaining rocket carcase. This can be done by pushing the payload and carcase apart, using a spring or piston. A better method is to fire small rockets which exert a backward thrust on the carcase, slowing it down and allowing the payload to fly on and separate. This technique has the advantage of not increasing the final velocity of the payload.

DIGRESSION

Purists may notice that the expressions mass and weight have been used apparently at random and, if attempts at dimensional analysis are made, it is necessary to throw in "g" every now and again to make the sums come out right. The resulting confusion accurately reflects my own state of mind on the subject, my excuse being that once a rocket has left the ground, weight as we know it, ceases to have any meaning. The rocket is in a state of weightlessness or free fall. Discussion of the subject can usually be completely squashed by posing this question:--

Suppose a liquid rocket is launched vertically. At launching, the surface of the liquid is normal to the axis of the rocket, i.e., horizontal. If, after launch, the rocket is turned through say, $45^{o}$, what happens to the liquid surface? Does it remain horizontal, does it become normal to the rocket axis at its new angle or what? Take comfort from the fact that at least one expert, a Russian, in an authoritative reference book, gets the answer wrong.

For the hard core who prolong the argument, we had in my last job, an effective method of silencing them - they were invited to jump out of the window (we were on the sixth floor) with a bottle half full of milk firmly grasped in one hand, and tilting the bottle as they fell, to observe the behaviour of the liquid surface. We had very few takers.

SPACE LAUNCHING AND TRAVEL

Movement to, through and from space is basically a question of velocity. We can predict the velocity required for any given mission and from our knowledge of rocket performance, work out what is needed. The key parameter is the payload mass fraction which is a function of the mass ratio and the structure factor. The mass ratio, for

a given total velocity, is a function of the specific impulse. Improvements in payload mass fraction can only come about by increasing the specific impulse and by reducing the structure factor. Both are already very close to practical limits.

In the first American manned orbital mission the reciprocal of the payload mass fraction was over 100, i.e., of the total initial rocket mass, less than 1 percent was useful payload.

With the best liquid propellants, a very high quality structural design and a complex multistage rocket vehicle, the future figure for a similar mission (near earth circular orbit, 100 miles up) is unlikely to be less than 30, which means that for every ton put into orbit, 30 tons must start out from the launching pad.

Current figures for interplanetary probes, to Venus or Mars, are at least 250. Allowing a man a capsule of 10 tons to live in for the journey, and assuming that he needs as much effort to return as to get there, the rocket would weigh about 650,000 tons, ignoring little local difficulties such as landing and taking off.

The magnitude of the problem prohibits solution by brute force and other techniques are needed - orbital rendezvous, powered space travel, using electric and nuclear rockets, and increased launcher rocket performance, using nuclear rockets, or very high energy propellants such as hydrogen, fluorine and beryllium mixtures (tri-propellants).

One further technique is a possibility - the use of air breathing aerodynamic vehicles for the initial stages of launching. These are large, pick-a-back aeroplanes which could carry the subsequent rocket stages to the limits of the atmosphere, and which would be capable of returning and being used again. Their feasibility depends on the solution of the problems of hypersonic flights - Mach 7 and above.

## THE FUTURE

The emphasis here has been on rockets designed for space, or possibly ICBM, application. These represent the most highly developed types of rocket, but the principles apply to all rockets.

Missiles are already almost universally solid. The advantages are so great that, short of a breakthrough of some sort, they will hold the field for some time to come.

The liquid rocket has a successful history of development and is capable of the highest performance at present available. The improvements which have been discussed here must come if space travel is to be more than an expensive scientific curiosity and the recent decision by the US Government to proceed with the development of the Rover nuclear rocket is significant.

The large rocket is an expensive and cumbersome piece of equipment. It is a most uneconomical form of propulsion in the atmosphere and it is difficult to imagine any commercial role, within the atmosphere, which cannot be carried out better by air breathing engines and aerodynamic vehicles. The further development of the ram jet and solutions to the problems of hypersonic flight, would make the commercial use of the large rocket even less likely.

END

DO YOU WONDER WHY THE BULLETIN HAS ERRORS

In one column there are some 2500 letters with thousands of possible transpositions. In the sentence, " To be or not to be ",by transposition alone 2,759,022 errors may be made??????????????????

# PACKAGING AND DOCUMENTATION

## OF ELECTRONIC TEST EQUIPMENT

Illustration I

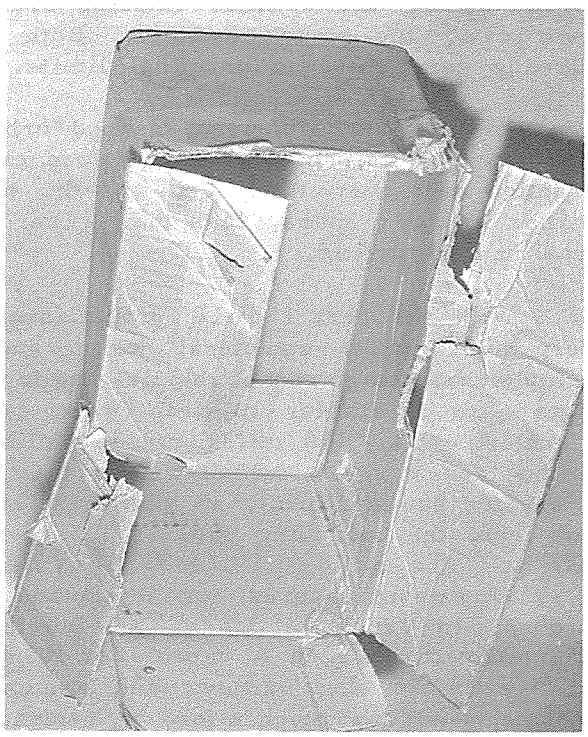
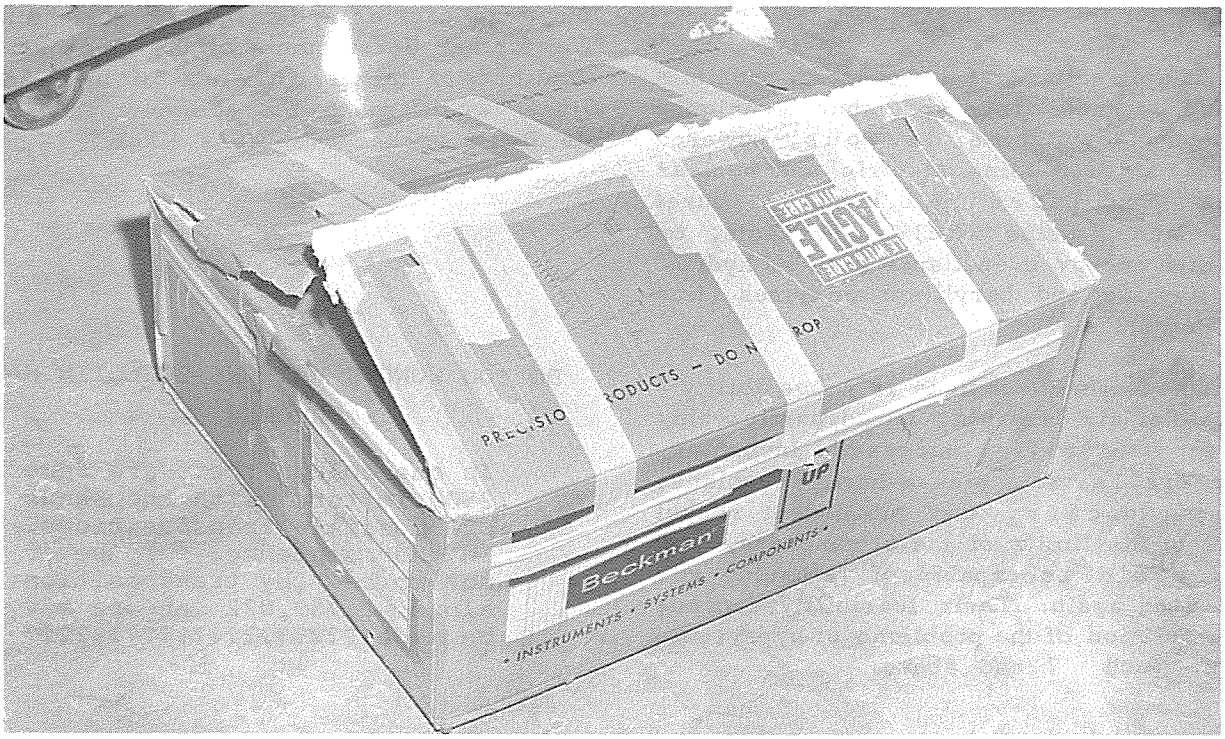


Illustration 2



## PACKAGING AND DOCUMENTATION OF ELECTRONIC TEST EQUIPMENT

Our story begins in the area of 202 Workshop Depot called the Planning Group, a part of the Production Engineering Department familiarly known as the twilight zone. We see the planning officer gazing in a very cloudy crystal ball muttering!!Q !! over two very old chestnuts, packaging and documents which have again become large headaches.

Since last year when 202 Workshop Depot was made the Calibration Centre for Montreal and Eastern Quebec the number of electronic test equipments being shipped to 202 Workshop Depot has greatly increased as has the number and type of units which are shipping to us. It is obvious from the numerous examples of poor packaging and improper documentation noted here, that either the present regulations are inadequate or many units' knowledge and understanding of these regulations are inadequate.

Equipment being sent to us for repair or calibration is usually tagged Non-Serviceable (N/S) or Unserviceable (U/S), and we feel that this terminology tends to give people the impression that the equipment so tagged is perhaps one step removed from scrap and consequently the stores are handled with not much more care than scrap might receive. Illustration No 1 is an exaggeration, but it makes the point very graphically as to how units appear to be handling stores, at least judging from the condition in which they are received at 202 Workshop Depot.

Illustration No 2 is a good example of the type of containers being used and the resulting damage which occurs in transit. Test equipment valued up to $3,000.00 is received not only without proper wooden packing cases, but also without basic metal covers. All sorts of nondescript boxes, cardboard cartons and packages are being used without so much as a sticker or marking such as "Fragile", "Handle With Care", "Delicate Instrument" etc., to indicate a little extra care in handling is required.

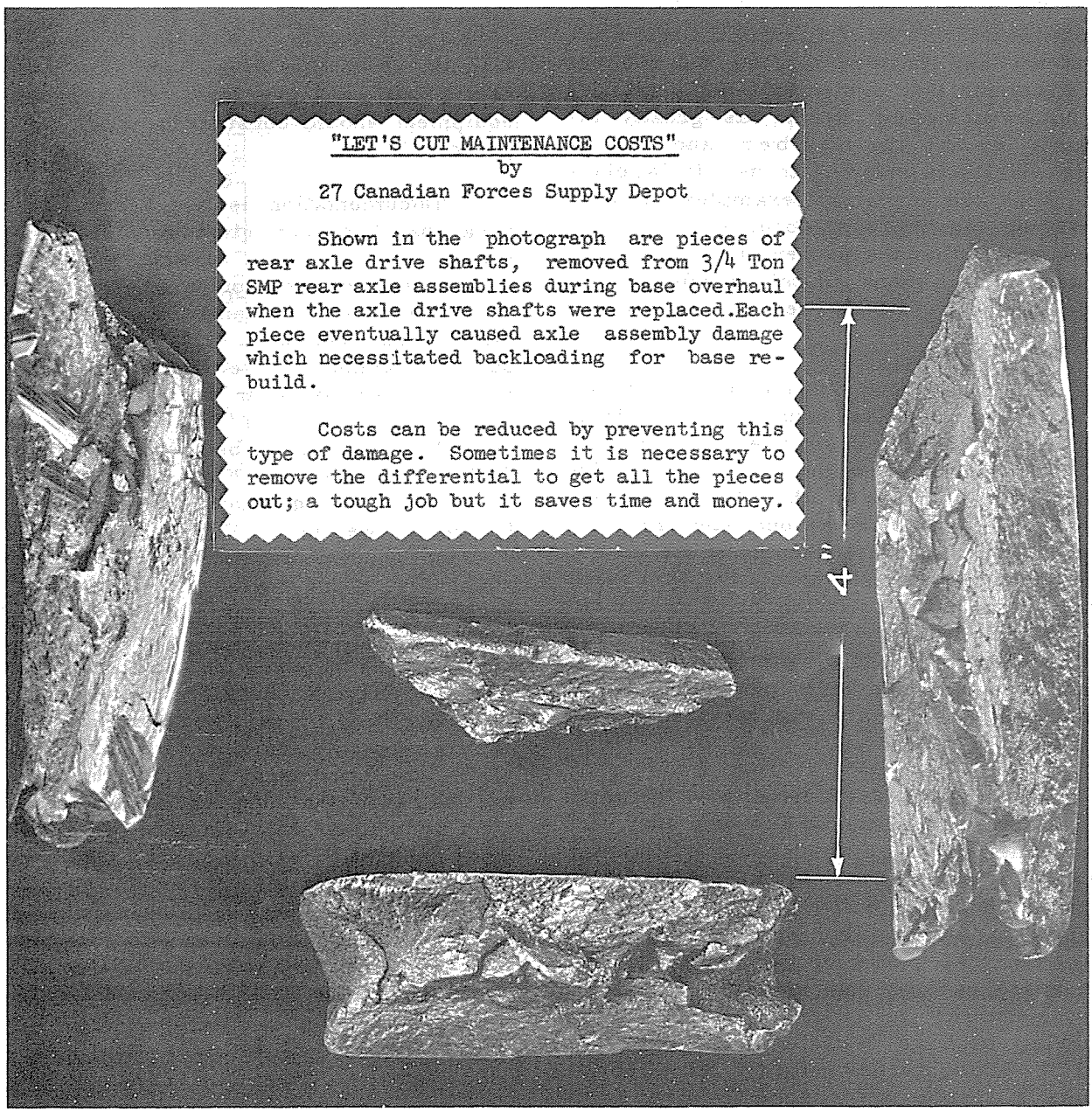
The use of terms such as N/S or U/S should be eliminated in relation to electronic test equipment as they tend to degrade the value of the equipment rather than classify its condition. The term "REPAIRABLE" is considered more suitable and all personnel must be impressed with the need to treat repairable equipment with the same respect as serviceable equipment as the margin between repairable and serviceable equipment is often a few minor adjustments which can be processed at minimal time and cost. Too frequently the margin is increased to several hundreds of dollars because of needless damage in transit. Units that have little experience in the art of packaging and shipping delicate equipment should consider courses for their personnel.

Documentation is the second problem area that has been given considerable emphasis. As a result of our responsibility for calibration, equipments are often received without documents of any kind, way bills, issue numbers or even letters in duplicate asking for receipt on the duplicate copy. As explained in the EME Manual all equipments sent to a workshop for repair or calibration must be accompanied by a CAFC 2149 Request For Repair Services. I underline "accompanied" because all too frequently we get CAFC 2149s in the mail with no equipments and the equipment may not show up for weeks or conversely the equipment arrives first and the CAFC 2149 comes weeks later. Since the CAFC 2149 identifies the owner of the equipment, specifies the services required, gives the date the equipment is required back at the unit and is also the work order on which repairs are processed through the shop, it can be seen that the equipment and 2149 must be together before work can be started. Since calibration of equipment has a priority there is no requirement to submit the 2149 first to get an acceptance date for the equipment. Equipment for calibration is accepted immediately and equipment and 2149s should be submitted together in the same container.

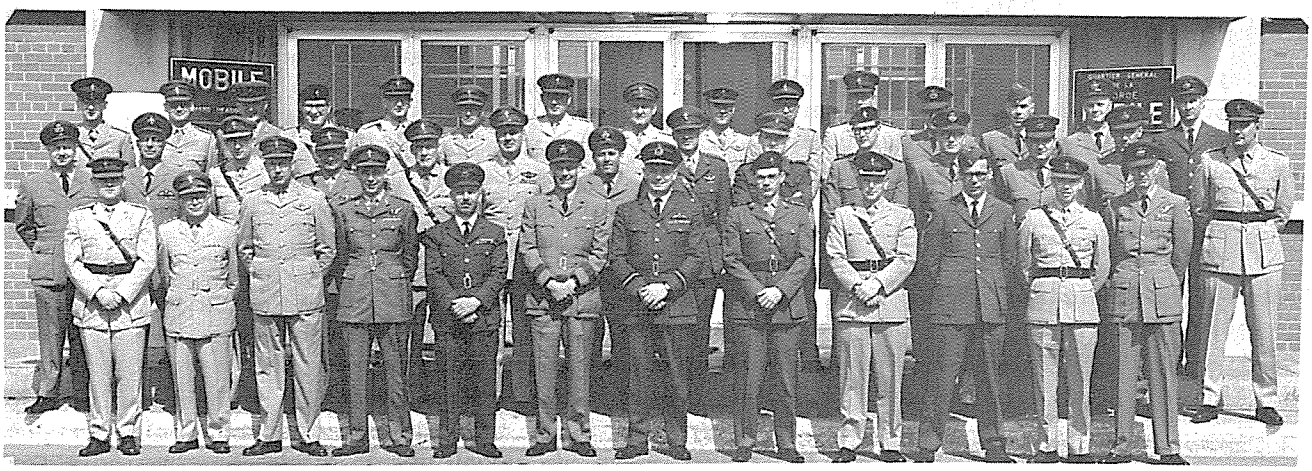
One other area of concern might also be mentioned, that is, equipments being shipped without the ancillary items necessary for repair, test of calibration. Much extra effort and many delays can be avoided if a little forethought is put into preparing equipment for shipment and ensuring that all the required kits and pieces are included. Don't forget, also, that where equipments are calibrated as matched sets that both equipments must be sent even though only one requires repair.

In conclusion we can sum up our story by saying that good service to you our customer can only be provided if you have done your part.

END


"LET'S CUT MAINTENANCE COSTS"
by
27 Canadian Forces Supply Depot
Shown in the photograph are pieces of rear axle drive shafts, removed from 3/4 Ton SMP rear axle assemblies during base overhaul when the axle drive shafts were replaced. Each piece eventually caused axle assembly damage which necessitated backloading for base rebuild.
Costs can be reduced by preventing this type of damage. Sometimes it is necessary to remove the differential to get all the pieces out; a tough job but it saves time and money.
4"

# MOBILE COMMAND LAND/AIR MAINTENANCE CONFERENCE




FRONT ROW L - R

**Lieutenant PEDNEAULT, Captain THOMPSON, Major CHAPMAN, Major LAVIOLETTE, Major LOVELACE, Lieutenant-Colonel WOODRUFF, Brigadier-General GOSS, Captain FRASER, Major GEARY, Captain PATEY, Major PERRIN, Major McGREGOR.**

MIDDLE ROW L - R

**Captain MACPHERSON, Captain MORSE, Captain McEACHERN, Captain ARMSTRONG, Major ROCHEFORT, Major SHEEHAN, Captain LANGLAIS, Major KENNAH, Captain COOPER, Captain LAMB, Lieutenant CASSON, Captain MORRIS, Capt WHYLIE, Captain RAY.**

BACK ROW L - R

**Captain BRITT, Captain MARTEL, Major McCULLOCH, Captain SCAGNETTI, Lieutenant HELLMANS, Major MILLAR, Major NICHOLSON, Captain KAYE, Captain MANNING, Major MASUDA, Captain PERREAULT, Captain RUNDBERG, Lieutenant WALL, Captain FORD, Captain SHEPHERD.**

A Land Air Maintenance conference was held at Mobile Command Headquarters St Hubert on 8-10 May 68. The Theme of the conference was Maintenance effectiveness. BGEN DW Goss opened the conference with a keynote address on the broad subject of maintenance policy within the Canadian Forces. LCOL M Ruscher and CAPT (N) JE Roue reviewed the introductory phase of maintenance within the DEVIL programme. LCOL GA White and LCOL RJ Gurney gave briefings on the officer classification system and the Mens' Trade Structure. LCOL RA Wallace briefed the conference on Job Training and formal training for the technical trades. The programme also included talks by CAPT RA Roux on non-destructive testing and the spectral oil analysis programme by CAPT W. Morris.

Prior to convening the conference all maintenance units and sub-units of mobile command had been invited to submit items of interest to maintenance personnel. These items were presented to the conference for discussion.

At the conclusion of the conference all officers were given a tour of the facilities at 202 Workshop Depot.

The conference was organized and directed by LCOL FC Woodruff of Headquarters Forces Mobile Command. The success of this conference indicated that it should become an annual event.

## WHY SUMMERIZE OR WINTERIZE VEHICLES

BY WO GOATHER, JA

Every year I ask myself the same question and I have never yet been able to convince myself that it is really necessary with our modern day advancement in vehicles and the products required to maintain them.

Five years ago it was quite common to see advertisements telling us it was time for our Spring or Fall change-over with regard to the oils and lubricants used in our car.

Nowadays we are bombarded with the advantages of multi-grade oils and lubricants while we try and watch our favourite hockey team on television. When one thinks of the cost and disadvantages of Winterizing and Summerizing, it's amazing that someone has not written on this subject before now.

On the Base where I am employed as a Vehicle Technician, we service 270 vehicles ranging from a small 1/2 ton panel to the large 5 ton dumps and cargoes.

The Base Maintenance Section has to disrupt the normal vehicle repair schedule to do this change-over and at least three or four personnel must be employed in this operation for a month to complete it on time. The lubrication equipment is overloaded and dare not break down otherwise the whole operation is disrupted. Also this is one of the dirtiest jobs one has to do on vehicles and everyone dreads having to start it. Afterwards one notices that some of the vehicles we serviced last Fall have only travelled 300 miles and we are changing the oils.

It can be argued that some of the vehicles would require servicing at the time of the change-over. This is quite true but the others that do not need servicing are interrupting a continuous maintenance schedule which is the aim of our inspections and routines. The cost of multi-grade oils and lubricants would be more per gallon but a saving in the amounts used is sure to balance out. The cost of labour would be a definite saving and better utilization of our Technicians would most certainly be an advantage.

## GO AHEAD BE A "BOAT ROCKER"

Looking for a better way of doing things is sometimes thought of as "rocking the boat", but it pays off.

You get an extra "lift" in job satisfaction by working out a better way - smarter way, and frequently an easier way of doing the job.

The approach is called Work Simplification. Here are the steps.

a. First: identify a part of the job which you suspect could be done better. It might be the most routine part of the job. (A group attack is best: by the man on the job - you, the man responsible for area, an assistant, maybe a person or two who might provide some specialized information, and a Work Simplification Co-ordinator if one is available.

b. Second: mark down all the facts and angles of the procedure or job.

c. Third: then say "Why" to all these "facts". And let your imagination spurt out in all directions, not discounting any way of improvising, cutting, or adding to achieve the end result.

d. Fourth: the realistic examination of all the suggested ideas to combine, simplify, or eliminate parts of the job. It must be a 100 per cent honest appraisal. The best solution is selected and developed.

e. Fifth: apply or install you idea and then follow-up with examinations and continuous use of the new way. "Follow-up" is sometimes difficult: Habit must be broken.

## SUGGESTION AWARD

Brigadier General J.C. Gardner Commander 4 CIBG presented Master Warrant Officer R.D. Dunham CD with a certificate and cheque for $1,020,00.

MWO Dunham received the Award for developing a method and procedure for repair and testing of Radiac Dosimeters. A radiac Dosimeter is a device worn to detect and measure the amount of radiation encountered by the individuals.

Prior to the submission of the suggestion, the Dosimeters were relegated to scrap, because they were, assumed to be beyond repair after use. Replacement costs varied by type from $7.18 to $46.28.

MWO Dunham, while at 202 Base Workshop (RCEME) during 1963 to 1964 devised a repair procedure designed tools and jigs necessary to effect the repair. Finally he submitted the packaged suggestion to his local suggestion award committee, who passed to DEME, DOS and Commander Materiel Command for evaluation. The repair procedures were instituted and during the first year saved the Forces $31,429.07.

MWO Dunhams award four years later was $1020.00.

## NO CONFLICT

Any endeavor as complex as aviation maintenance presents its followers with seeming contradictions that sometimes puzzle and confuse. We are told, for example, that a mechanic should have initiative and ingenuity, that he should be able to think for himself. But at the same time he is required to follow instructions, "obey orders" is the way the military puts it.

In most cases the instructions or orders or established procedures are explicit and unmistakable. They make no allowance for experience or judgment, afford no place for individual ideas. And so, it might be asked, if one must follow like a sheep and do exactly as he is told, what about initiative and ingenuity?

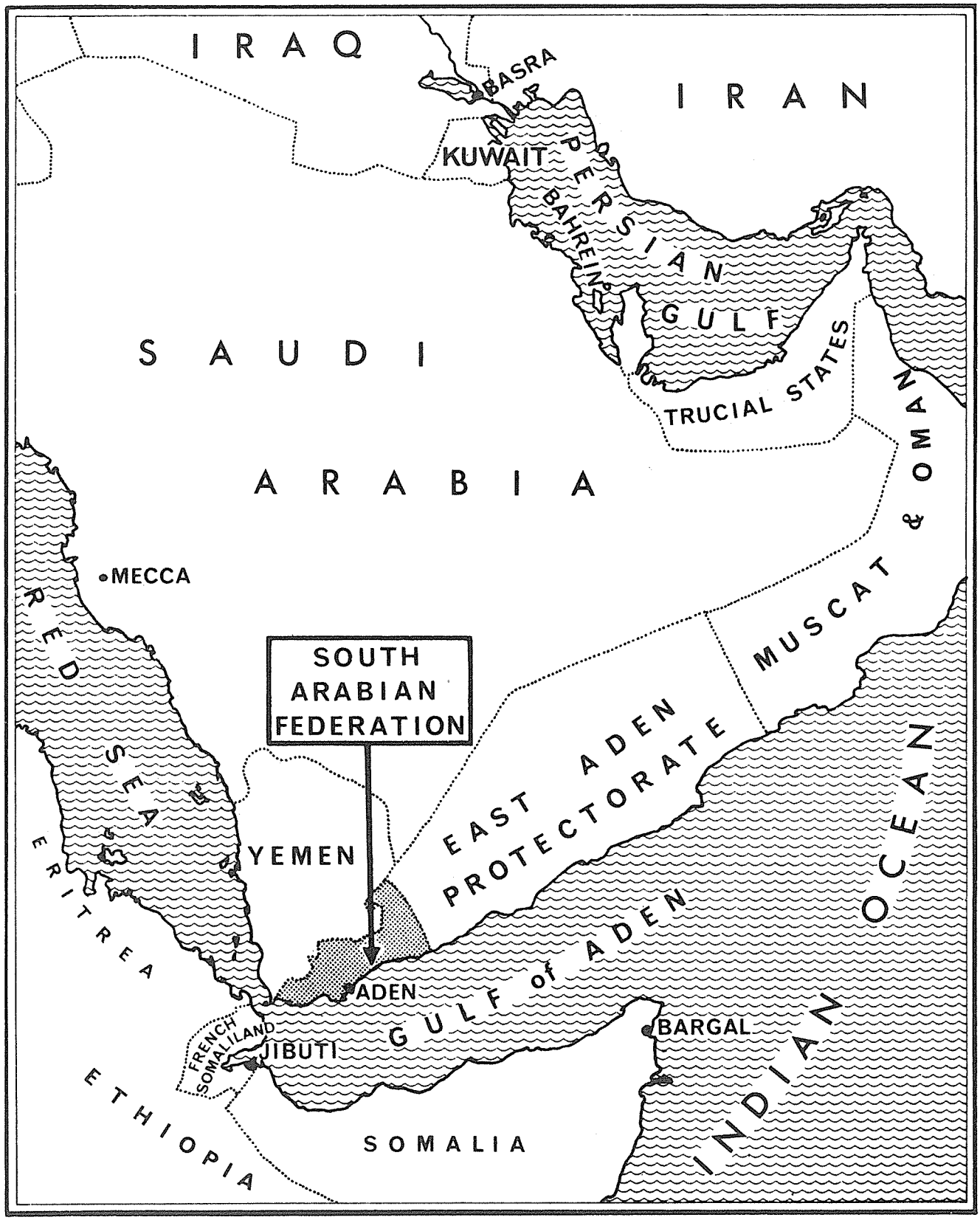
Actually there is no conflict.

Each procedure was established to achieve the greatest possible degree of reliability and safety. It represents the Company's considered opinion based on the facts known at the time. The best and quickest way to test it is for everyone to follow it exactly. If it works, well and good, if it doesn't that fact will be evident. There is nothing sheeplike in pursuing such a course. In fact, it is the approach of the research scientist.

Of course, it is quite possible that the established procedure can be improved. This is the place for initiative and ingenuity and individual thinking. If you have a better idea submit it as quickly as possible. Don't just decide that the Company's procedure is wrong and do things in your own way. Get your idea out where it can be examined. If it is good it will be accepted. Even if topside doesn't buy it you will have increased your capabilities and improved your position through the experience.

In our business the willingness to follow instructions ranks equally with the ability to think. Cultivate them both.

-Flight Safety Foundation, Inc




Location of

# MIDDLE EAST COMMAND

# WITHDRAWAL FROM ADEN

BY

Colonel J.D. Kelly, M.B.E., M.A.,
A.M.B.I.M.

Editors Comment: The following contribution was sent to us by the editor of the REME monthly magazine "The Craftsman". It is a condensed account of an article written by Colonel J.D. Kelly, M.B.E., who was CREME, HQ Middle East Command from October 1966 until the withdrawal.

## BACKGROUND

This article covers 1967, the last year of Aden's existence as a base after 128 years of British rule. During this year the planning and execution of the withdrawal of British Forces reached its major phase. Aden was the location of HQ Middle East Command, a Joint Service HQ which has been established there in 1961. The Command area was approximately 4,000 miles square. Within this Command there was a main British base in the Federation of South Arabia, with its principal concentration in Aden State, comprising Aden and Little Aden. The remainder of the Federation was usually referred to locally as 'up-country'. There was a smaller base in the Persian Gulf. The Army strength in the Command was approximately 12,000. Of these, some 10,000 were in Aden State and the Federation. The force included an airportable Strategic Reserve Brigade, 24 Infantry Brigade, and Aden Brigade which comprised the bulk of the internal security forces.

The Army Air Corps were represented by three Theatre flights, and there were five integrated unit air platoons or troops. Also in the Command were a number of squadrons and special detachments of Royal Engineers. The Engineer role consisted primarily of 'Hearts and Minds' activities throughout the Federation of South Arabia. These activities included such tasks as well-boring and civil assistance, and also the major task of constructing 47 miles of hardtop, the first all-weather road ever built up-country in the Federation. Support of the Royal Engineers posed a particularly difficult REME problem.

The main responsibilities of the Command were fourfold; Command contingency commitments, build-up of the new Persian Gulf Base, run-down of the Aden base, and combating the serious internal security situation in Aden and the Federation. This article describes only one of these tasks, the run-down of the Aden Base.

Although Aden was described as a base, it had no REME base facilities. There were four REME second line workshops. The principal one was 52 Command Workshop, which carried out repairs and modifications up to heavy second line and such local manufacture as was within its resources. Its strength was 150 military and 300 locally employed civilians. The remaining three workshops included 1 Infantry Workshop (Airportable), which was equipped to fly-out in support of contingency tasks wherever needed, and which was 150 strong plus 50 local civilians. Finally there were 74 Aircraft Workshop (80 strong) and 22 Engineer Equipment Workshop (50 strong). All except the Aircraft Workshop had recovery facilities. Units had their normal first line REME support.

Work which could not be completed in the Theatre had to be backloaded to UK. There was no intermediate stage, and local contract facilities were limited.

## OPENING SITUATION

In the simplest terms, run down planning consisted of figuring out where you were to begin and where you wanted to be when you had finished and then deciding the steps to be taken in between to achieve the transition. It may seem facetious to suggest taking stock of where you are before you start, but when a base has been

going for some years it develops ingrained habits, and many practices continue for reasons lost in the mists of history.

An analysis of workshop activity was therefore completed for the year 1966. A simultaneous check was made of the length of time equipments had waited repair in workshops. The bulk of the load had been in for a normal period. However, except in the Command Workshop which handled the Aden as opposed to the up-country load, there was a fairly even spread of remaining equipments which had been in workshops for up to 62 weeks. Most of the equipments over 26 weeks were engineer plant or similar equipments. Some required 800 - 1,000 man hours of work.

The Radfan operations, (see Editor's Note)* in 1964 had left a legacy of very worn engineer equipment. The worst had been sentenced beyond local repair, but what was left was of doubtful reliability. The takeover of airfield construction responsibility from the RAF in August 1964 had further added to the REME dependency. There was almost no standardization and spare parts presented a difficult problem. 22 Engineer Equipment Workshop, which formed in October 1964, was from its inception under heavy pressure to keep operational the equipment in use. It never had the resources to get on top of its backlog.

It was easy for a vicious cycle to develop. A non-runner would await spares for say eight weeks. Then when it was run, it might be found that the hydraulics were faulty, and perhaps another eight weeks would go by while more spares were obtained from UK. However, by the time the second set of spares arrived, the equipment had been cannibalized to meet some urgent operational crisis up-country. By the time the third set of spares turned up, the equipment had deteriorated so seriously in the Aden climate that no one really knew where to begin!

* Editor's Note: The Radfan operations were designed to establish control of the Radfan Mountains and their numerous passes on the border between Aden and Yemen, and thereby prevent the massive infiltration of arms and Yemeni terrorists.

## PLANNING FACTORS

Having assessed the REME situation in December 1966, it was necessary to decide on the steps to be taken to achieve the desired result. These can be briefly summarized as follows:

a. Immediate time limits placed on equipment repair.

b. Misuse reporting action scrapped.

c. Technical assessments carried out on vital equipment, and action taken to ensure serviceability.

d. Formation of ad-hoc teams to inspect and repair equipment in situ thus cutting out paper work and applying the stitch in time principle.

e. Integration of REME and RE repair groups, often using "fly-in" forward repair techniques to deal with engineer plants.

f. Anticipatory action taken in civilianized 52 Command Workshop to minimize effect of general strikes. There were 20 days of strikes between 1 Jan and 31 Jul 67.

g. Introduction of tailormade movement priorities for spares ex UK by air to meet changing requirements.

h. Careful planning to concentrate on essentials and skip the desirable.

## PATTERN OF EVENTS

A senior staff officer once remarked, that in the light of all the uncertainties any relationship between what was planned and what actually happened would be purely

coincidental. Planning had however been very flexible, and had been designed to ensure that even if REME officers could not always dictate the course of events within their sphere, at least they could avoid being caught off balance. Planning had been completed on the assumption that the date of Independence would be January 1968, but sufficient slippage was built-in to allow for a delay of up to three months in this date without serious consequence. Any longer delay would have meant a fresh start, and reinforcement of men and materials from UK. When the date of Independence was announced in Jun 1967, this slippage was no longer necessary. Nevertheless a small lag was retained in the run-out of REME until November 1967, as a contingency reserve.

During the year a number of decisions made in the light of operating experience are worth recording. These were:

a. It was Ministry of Defence policy that all armoured vehicles not redeployed to the Persian Gulf should ultimately be returned to UK. The policy for engineer plant however, was to balance residual unrepaired value against repair and shipping costs.

b. Normal vehicles fell into three categories, based on age. The best were selected for the new Persian Gulf Base, the next best for the UK or other Commands, and the remainder for local disposal. HQ Middle East Command issued early in the year a list showing the ultimate disposal of each vehicle by registration number. This permitted substantial repair economics, as repair was balanced against residual requirement.

c. The Corps repair capability steadily reduced from July 1967 onwards. For this reason a local repair pool was created from the best of the local disposal vehicles as they were withdrawn from units, with a view to relying in the later stages on substitution rather than repair. It had also been planned to rely increasingly on red star air-freight from the UK.

d. It was often found that by the estimated time of completion of repair, the equipment would no longer be required. This particularly applied to specialist equipments. Repair was not therefore commenced in these circumstances.

e. When a top priority demand resulted in notification of nonavailability in UK, workshops would investigate alternative methods of completing the job. If there were none, repair was abandoned.

f. The repair of vehicles destined for the Persian Gulf was a Command Commitment. Many unit vehicles did not however become available until late in the year. Vehicles requiring extensive repair, or for which spares were not available locally were therefore crossloaded unrepaired to 65 Station Workshop REME, Bahrein and a team sent from Aden to assist in their completion.

During the first half of the year second line repair and recovery responsibility were gradually concentrated in 52 Command Workshop. All up-country REME detachments were withdrawn by 30 June 67. By 1 August, 52 Command was the only workshop functioning, except for the Aircraft Workshop. The repair limits which had been imposed earlier in the year had been tightened progressively. On 1 August, 52 Command Workshop was restricted to work which could be completed within two months. On 1 September this period was reduced to one month, and on 1 October to two weeks.

Based on a 9 January 1968 Independence date, it had been planned to complete withdrawal in the following sequence. On 15 October, 52 Command Workshop would cease to accept further work, and would

then be given until 30 October to complete work in hand and until 15 November to disband. On 15 October a rear element of the workshop, consisting of one officer and 45 REME tradesmen, would open under the technical control of BEME Aden Brigade, to support REME first line resources to final evacuation. Ordnance would open a matching rear element of the Ordnance Depot to provide spares support. The Ordnance element would hold about 3,000 item headings, but no major assemblies, except for Saracen and Saladin armoured vehicles. The task of the workshop rear element would be recovery and first line repair of vehicles and plant, field repair of Saracens and Saladins, and field repair of radios, instruments and small arms. Its charter would be to do anything practicable. If a field repair to a vehicle other than a Saracen or a Saladin became operationally vital, stores would be obtained either by Priority 1 air freight demand or by cannibalization.

In the event withdrawal was accelerated to 30 November 67. This had been anticipated in the planning and it was a simple matter to advance the relevant dates accordingly. The Workshop rear element opened on 1 October, and disbanded (with the exception of ten tradesmen) on 10 November. These ten tradesmen were placed at the disposal of BEME Aden Brigade, until his withdrawal at 1800 hours 29 November. It all worked very successfully.

The closure of 74 Aircraft Workshop was matched to the phase-out of Army aircraft from Aden. The aircraft stagger chart was so planned that no minor or major servicings became due in the closing months.

## CONCLUSION

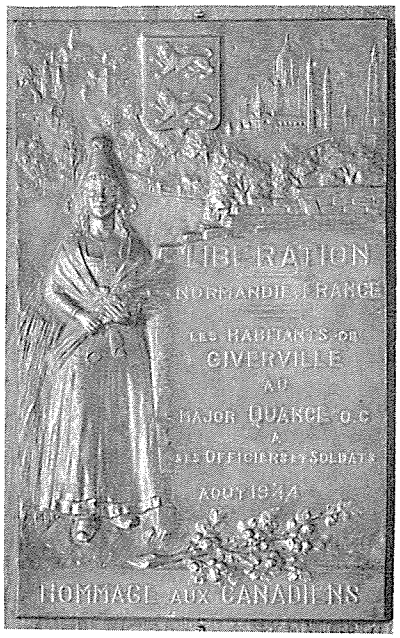
This article has described the broad outlines of withdrawal planning as they affected REME. There has not been space to include the more detailed facets which were many times more numerous. Nor has mention been made of Inter-Service aspects, for many REME activities were co-ordinated with those of the RN and RAF. During the preparation for withdrawal, build-up of the new Persian Gulf base was proceeding in parallel.

All these activities took place against the background of a mounting wave of terrorism, directed indiscriminately against military and civilian men, women and children. As an example, in August 1967 alone, the number of terrorist incidents, approximately 800, exceeded by 300 the total for the whole of 1966. It is difficult in retrospect to convey the atmosphere of tension against which life in Aden was lived. Terrorism was not directly to blame; the uncertainties which be-devilled every day's activities played a large part. All the Command were affected by this uncertainty, which stemmed from the intractable political situation in the Federation.

Perhaps one's most vivid memory of this last year in Aden is of the extraordinary steadfastness, good humour and courage displayed by the men and, while they were here, the women and children too. Also, no praise is too high for the outstanding work of our men - and this includes their NCOs and officers. They often worked prodigious hours, under conditions of extreme heat, discomfort and not infrequently danger. Yet their tails were up, and they always produced the goods. Many members of the Corps were awarded the Commander in Chief's Commendation. There must have been many others, who, unseen and unsung, nevertheless earned it too.

END

# The COVERALL




FOREWORD TO THE FINAL EDITION OF 'THE COVERALL'

(This interesting bit of RCEME history is made available to readers of the Quarterly by WO2 D L Clarke, 208 Workshop, who was a senior NCO with the unit. — Eds)

The first edition of The COVERALL was conceived, written and published on the shores of Normandy by men of First Canadian A Troops Workshop. Its weekly editions contributed greatly to the welfare and esprit-de-corps of the unit during those fast moving days through France, Belgium, and Holland.

It is fitting that this, the last edition of The COVERALL, should include ... a brief outline of the history ...

As Commanding Officer ... I reflect with great pride on the achievements of the unit ... a unit that will take its place in the proud history of the First Canadian Army.

A.O. Drysdale, Major
Editor-in-Chief

# Our History

## ORIGIN

On the 31st of January 1943 when the First Cdn Army Troops Workshop, RCOC was formed in England it was patterned on the British organization The Corps of Royal Electrical and Mechanical Engineers (REME). This was one of the preliminary phases in the separation of the engineering branch or Ordnance (E) from the Royal Canadian Ordnance Corps. It was not a complete separation however until the 15th of May 1944, when the Corps of Royal Canadian Electrical and Mechanical Engineers was authorized by Order-In-Council.

## MONTREAL – CANADA

The nucleus of our present Unit can rightly be traced back to Canada, Montreal, to be exact, and to the mobilization of 10 Canadian Non-Divisional Ordnance Workshop, RCOC. 10 Non-Div Workshop was mobilized under the Command of Major, now Lieut-Col B. H. Miller and his Unit of three hundred and fifteen tradesmen assembled in Westmount Barracks in Montreal in preparation for their trip Overseas. They boarded a troop train at Montreal and rolled along to that famous "East Coast Canadian Port" where they embarked on a troopship and sailed for the United Kingdom. After disembarking at Greenock, Scotland, they started on that long exhausting train ride to "Good Old Borden"!

## TILLINGBOURNE, SURREY

In a short time the Unit was put on a 'Field' basis and stationed at Tillingbourne House, Westcott, Surrey. In order to service, with second line repairs, the Units in this non-divisional area, it became necessary to divide the Unit into several groups. Headquarters and Number two group remained in Tillingbourne, Number three group moved to Aldershot and Number one group settled in Caterham.

In October 1942 the Canadian Army Overseas took steps to adopt the British REME Oganization and began to reorganize and form new units patterned on the British system. So on the 31st of January 1943 the 9 and 10 Canadian Non-Divisional Ordnance Wokshops, RCOC were re-organized into 1 and 2 Canadian Corps Troops Workshops RCOC and First Canadian Army Troops Workshop RCOC. The Commanding Officer and a large proportion of the personnel of First Canadian Army Troops Workshop were from 10 Canadian Non-Divisional Ordnance Workshop.

## CATERHAM

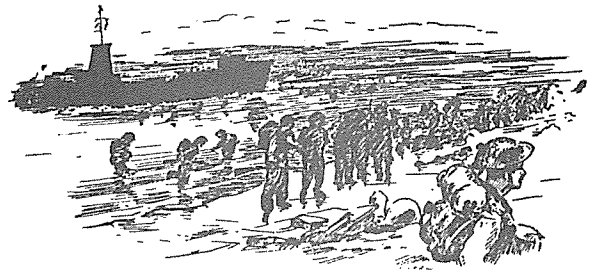
The new Unit moved in on the old "Number One Group" and took over Caterham-on-the-hill. In this location the men worked hard and the Unit soon developed into a spirited and efficient workshop. The doors of the local residences were opened and many found homes and friends that will always be remembered.

The sections were well spread out with the Armament Shop nearly a mile away from the Vehicle Shop. This isolation trend characterized the Armament Section as future events always found the Section out on detachment with the Artillery Units. General A. G. L. McNaughton, C.B., C.M.G., D.S.O. honoured the Unit with a visit and passed his favourable comments on the work of the tradesmen.

The Unit will always remember those famous Canadian Army Exercises such as "Sparton" and that special RCEME Scheme in Army Troops called "Vulcan".

## EPSOM

The final phase of the scheme "Vulcan" with that spectacular demonstration and field day at Redhill found the Unit in its new quarters in Epsom. The Workshop soon settled into the "Old Ordnance Workshop Home Town" and occupied the site previously used by 1 Army Ordnance Workshop and 2 Canadian Corps Troops Workshop. As the boys gradually tapered off on their visits back to Caterham bigger events took their interest and preparations were made for the forthcoming Invasion. On the 15th of May with events moving quickly in an apparent calm the First Canadian Army adopted the Corps of Royal Canadian Electrical and Mechanical Engineers, Privates became Craftsmen and the Unit adopted the new name of First Canadian Army Troops Workshop, RCEME. News of "D" day spured the men on to complete the waterproofing of the endless line of vehicles awaiting their salty plunge. Finally that precious message arrived and the Commanding Officer gave the order to move off for an "undisclosed destination".



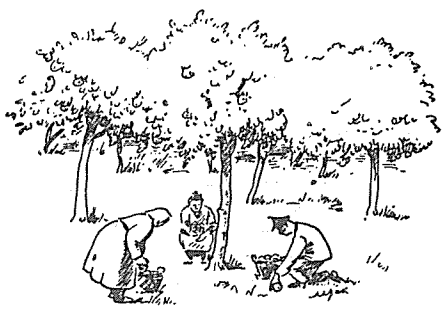
## NORMANDY – FRANCE

On the 31st July 1944 the Unit embarked in two flights on the Liberty ships Lee S. Overman and Empire General at Tilbury Docks on the Thames. Our O. C., Major Quance, was detailed O.C. troops on the Lee S. Overman. Following an uneventful sailing across the channel to the beach at Courselles, the Unit disembarked on the 4th of August, 1944. The two flights regrouped, stayed over night on the beach and moved inland a few miles to set up shop near Anguerney. The shop was relatively inactive in this location while the armies regrouped and prepared for the decisive push into France. The front was at Caen, only 10 miles away, and night raiders passed over frequently on their way to harrass the beach head. Personnel were well dug in and no casualties were suffered during the Unit's three week stay at Courselles.

## THE A.W.D. GOES TO CAEN

A few days after our landing in Normandy, an Artillery Advance Workshop Detachment of approximately fifty all ranks was formed to service 9 British Army Group Royal Artillery attached to the First Cdn Army. The detachment set up shop in Fauberg de Vaucelles near Caen. For 10 days the men worked ceaselessly from dawn till dusk in the heat and dust.

Enemy shells whined and burst all around but only the schrapnel reached the immediate area. As the Canadian advance gained momentum towards the Falaise Gap the AWD started a series of seven moves that ended with the crossing of the Seine River at Rouen. The AWD then took a breather on a V-1 site near Limésy.



## THE MAIN SHOP MOVES TO GIVERVILLE

Our second move introduced us to the Town of Giverville, which became known as "Our Town", we being the first Canadians to be stationed there. The "B" Vehicle and ancilliary shops started to get their first real work since arrival in this theatre of operations. With the exception of the odd bomber passing over, there was little sign of action. The boys all did well in this – their Town – being billeted in a large Chateau and enjoying eggs and calvados, which some will never forget. The Major and the citizens of Giverville, in their exuberance over the Allied drive through Normandy, and in their appreciation of our conduct and kindliness, decided to erect a monument in the Town paying tribute to this Unit and to all Canadians. After a week's stay the Unit crossed the Seine to its next location.

## CAILLY ORCHARD NEAR ROUEN

It was at this spot that we had our first change of command. Major G. W. Painter took over command of the Unit from Major Quance who was posted to Headquarters 2 Cdn Corps. Some personnel were fortunate enough to have a day in Rouen before the Unit moved.

## NEAR ABBEVILLE.

On Sept 9th, 1944 we opened in Monflieres near Abbeville, on the site of a former Jerry searchlight Unit. Work started to pour in from all types of Units in a volume not previously experienced.

## EBBLINGHAM FLYING BOMB ASSEMBLY SITE

Work was rolling in so heavily at this location that the problem of parts became serious and vehicles were being B.L.R'd as a result of the shortage. It was at this location the O R's shall remember the "Forbidden Bridge"!!!

## A.W.D. MOVES UP

When LeHavre fell into Allied hands the AWD made the long move from Limesy to a German Barracks at Colembert, outside Boulogne. Production reached a peak averaging 3 guns per day during the siege of Boulogne and of Calais. With the fall of Calais the AGRA by-passed Dunkerque and the AWD made 3 quick moves to Eecloo where it settled down while the Artillery and Infantry blazed away at the remaining Germans still holding out in the Scheldte.

## WORKSHOP MOVES TO GHENT, BELGIUM

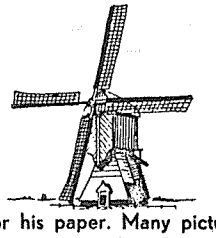
Our next big move was right into the City of Ghent. For the first time we had billets and buildings for our work, not to mention the pleasures of Town life. For a great many the City of Ghent will always hold memories. Remember that dance where there were too many girls, the Barge, the fire on the roof, the Production! As the Army prepared for its push into Germany, we made preparations to move.

## TURNHOUT, BELGIUM

This site was a former Belgian barracks decorated by the S.S. during their occupation. In everyone's opinion these were the best billets the shop ever had. We settled and were getting acquainted in the Town when 10 Cdn Gen Hospital moved in on us and we advanced to our winter quarters at Tilburg.

## TILBURG AND THE BUZZ-BOMBS – HOLLAND

It was here we settled down in our winter quarters. After much hard work, moving tons of dirt from our Workshop buildings and fixing up our billets we had the whole camp in grand shape. Work started to come in with about 75 % Limey vehicles and did the boys like that!!!! During this period the buzz-bomb war was going on and they spurtled over us almost continuously. Some times they would come in at very low heights and then, cut out. The climax came when one landed between the Officers' Mess and the Orderly Room. Although 21 people were killed no casualties were suffered by the Unit. The pay-off for the Unit came when we were ordered to STAND-TO at Christmas. This was brought about by the German Ardennes Break-through. This gave us a taste of trench digging and cold "watches" as we waited for German Paratroops who did not come. On the 15th of January Major G. W. Painter left the Unit to take command of 2 Canadian Tank Troops Workshop and Major J. W. Blatchford took command. During the month of February a reporter for the Montreal Standard stayed with the Workshop while he pre-

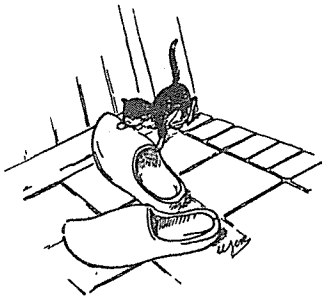


pared an article for his paper. Many pictures were taken of the men at work in the shop. As work increased, it became necessary to employ more Tradesmen from 21 Special Employment Coy and 15 civilians to release the Craftsmen used formerly on fatigues.

## AWD MOVES NEAR REICHWALD FOREST – GERMANY

On the 5th of February the entire Armament Section left Tilburg to join 5 British AGRA at Mook. The offensive on the Reichwald Forest started with the big guns firing over the heads of the AWD personnel. The Detachment then pushed on to Cleve which had fallen two days previously. This was the first large RCEME detachment to cross the German Frontier on the Front. Three days after arrival at Cleve the AWD came under fire from German self-propelled Eighty-eights which continued for ten days. The men's billets were hit twice on the roof and the working area received eight direct hits but no casualties were suffered. When the Canadian Army reached the Rhine the AWD returned to the parent Unit at Tilburg.

HENGELO, HOLLAND

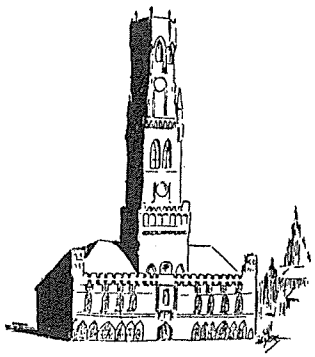


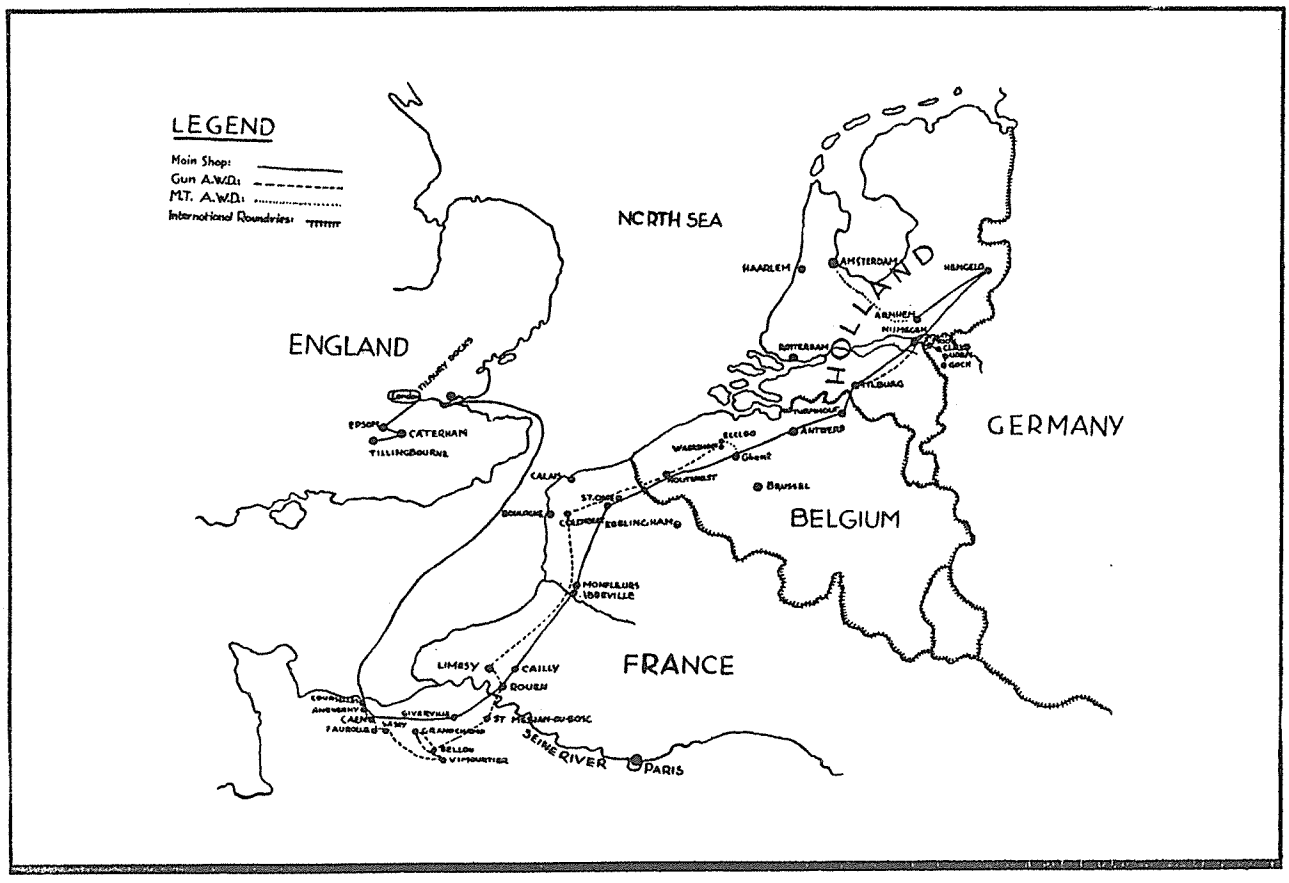
In the middle of April the Unit moved from Tilburg, crossed the Rhine, travelled through the much battered cities of Cleve and Emmerich and set up shop in a dusty lumber yard in Hengelo (O). Major C. G. Kirby arrived and took over command from Major Blatchford. The new O.C., a veteran of Italy, had no sooner settled in the Workshop when he was notified of his rotation leave to CANADA and Major A. O. Drysdale took command. The billeting accomodation was excellent with many getting civy digs. Expansion of the site was necessary as the work increased. The 8th of May, V.E. Day arrived and was observed as a Sunday. There was very little celebrating and all in all things were very quiet. Voting for both Dominion and Provincial Elections followed and unusually keen interest was taken by all personnel.

ARNHEM, HOLLAND

As the victorious troops returned from Germany to make way for the occupying forces and to regroup prior to return to Canada, it became necessary to move the workshop on the 8th of June. The new shop site was excellent, in a former German workshop block in the residential section of the City of Arnhem. The city had been badly damaged and the area heavily mined. The Unit lost five men, killed in two unfortunate mine incidents. Many new men were posted into the unit as long service men were returned to Canada.

With the prospects of another year away from Home, workshop production was cut and rehabilitation training and organized sports made to play a greater part. Work, study, leave, entertainment and sports offer the solution to passing many weary weeks of waiting for the grand day of return to the Loved Ones at Home.





# RECREATION TRAINING

## CANADIAN FORCES BASE CALGARY INTER UNIT HOCKEY CHAMPIONSHIP

First Row: Lt G. Dupont, Pte W. Cripps, Cpl J. Hawke, Pte G. Spence, Cpl E. Barnes, Cpl R. Howard, Cpl D. Lama.

Second Row: Pte I. McLeod, Cpl W. Gilchrist, Cpl J. Matheson, Pte R. Rowland, Capt E. Kingsbury, Pte W. Pfeifer, Pte D. Roth, Pte W. Price, WO R. Encarnacion, Pte R. Morton

Missing From Picture: Pte R. Grocholski Team Captain.

A group of high spirited, hard working, men from 1 Fd Wksp won the first championship of the CFB Calgary, Inter Unit Hockey League.

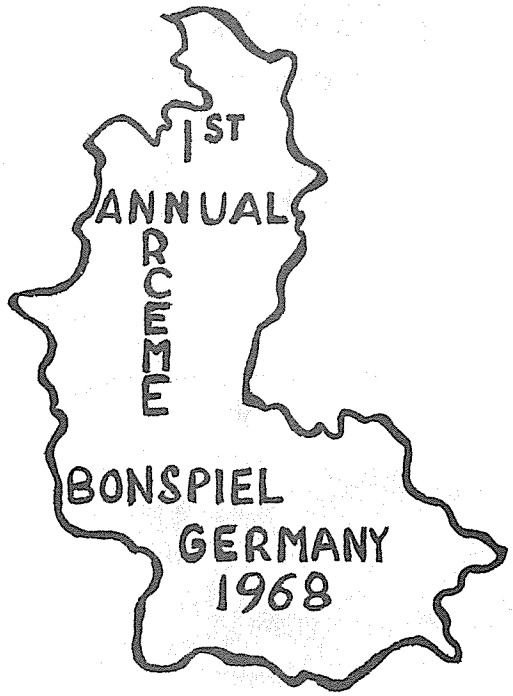
This team was formed in October, 1967, as a recreational hockey team. There was no intention to complete in a recognized league, but merely to have a little fun and exercise.

The coach WO Russ Encarnacion, watched a few shinny sessions, and assessed the possibility of a good team. After a few hard practices, the team had competitive status. The decision was made to enter the Base Inter Unit League.

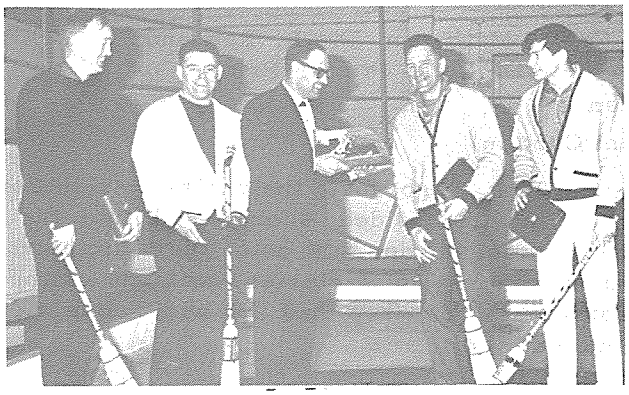
The league governing body agreed upon a twenty game schedule and three or four exhibition games.

The Wksp lost their first exhibition game by a lopsided score, and tied their next game. From this point the team started a string of victories, without another defeat. 1 Fd Wksp had 29 wins, one tie, and one loss.

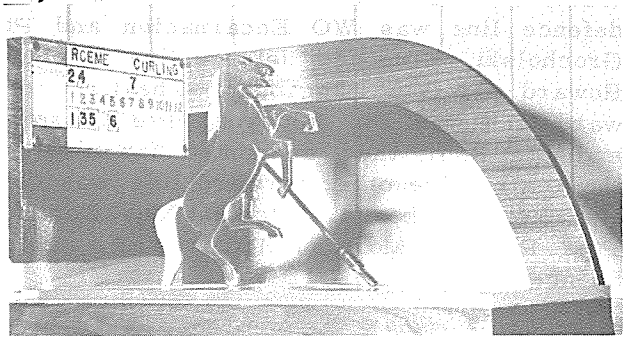
The team was composed of Cpl Lama in goal who was replaced by Lt Dupont for the finals. Lt Dupont was the RMC goal tender with a record of excellence. The defence line was WO Encarnacion and Pte Grocholski, a second defence line was Cpl Howard and Capt Kingsbury. The first forward line was Pte Rowland, Pte Cripps and Pte Roth; they accounted for most of the goals. The other forward line was Cpls Hawke, Matheson, Gilchrist and Barnes, Ptes Pfeifer, Morton Maidment, Price Spence.

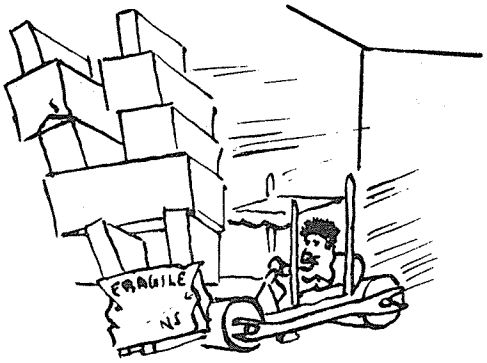



BY
JCG Nappert



Major J.G.R. Doucet presenting Trophy to winners: (Left to Right) CPL G.Gebhart CPL E Kinsmen, MAJ JGR Doucet, CPL JR Robinson, and CPL JC Robinson.





J.DAVID

In November 1967 the Dominion of Canada Rifle Association (DCRA) conducted a survey to select a fifteen man team to participate in the Australia and New Zealand Commonwealth match. The response was sufficient and a team was selected. The captain was Mr.Nelson Colville and Mr.Jim Holden was vice captain.

The team departed (via air) from Vancouver BC on 16 Feb.,arrived in Wellington 22½ hours later. Then to Trentham Rifle Range by bus the 25 mile ride was relaxing. The range is near a New Zealand REME workshop which is in a picturesque valley surrounded by high hills.

Great Britain won the New Zealand National Shoot,New Zealand placed second and Canada placed third. Prizes were presented on Saturday afternoon.

Sunday 25 Feb the team departed for Sydney Australia for a four day shoot at the New South Wales Rifle Club at Long Bay.The New South Wales won, Britain placed second and Canada third. The next stop was at Melbourne Australia where the Victoria Rifle Association provided bus transportation to the Merrit Range at Williamstown. This annual prize meet commenced on 7 March and continued for five days. Three Canadians,Mr.Derek Dandes;Mr.Deson Warner and MWO Frank Jeremy placed in the top 40 in the Queen's Match. The top 40 were presented with a beautiful gold wire badge. The Empire Match was won by Australia, Britain placed second and Canada placed third.

The tours and hospitality in New Zealand and Australia will be remembered for many years.

11 Common Close
Shrivenham,
Wilts, England,
20 April 68.

Dear Major Bateson,

I wonder if I could put a correction to an article in your Technical Bulletin Volume 12, Number 4, December 1967. The article on the "Fly in Breakfast-Canadian Style", makes no mention of attendance by the British Army. I want to put this right for several reasons:- I had a most excellent morning and breakfast with CSQN, 8CH. It really was a well organized party. The air traffic procedures were an excellent training mission as, no doubt, 'authorised'. (Oh! I did remember to reply to the invitation).

Perhaps, some confusion did exist for as a member of I flight AAC my aircraft was carrying the 'Maple Leaf', a token from former associations.

I hope the rumour that the breakfast will be an annual event is true.

Yours sincerely,
CAPT F.G.E. Grainger RE

FISH DO SLEEP SOUNDLY

ROME (AP) Soviet and U.S. Scientist now agree that fish do sleep, and so soundly they won't awaken either for lights or noise.

Like people, they do their best sleeping at night. They like a comfortable rock pillow.

In the past, scientist have never been quite sure. The new view was gathered by the UN Food and Agriculture Organization from reports at a conference on fish behavior in relation to fishing techniques.

The first testimony came from O.N. Kiseley of the Polar Research Institute of Marine Fisheries and Oceanograph in Murmansk, U.S.S.R.

Drifting about in a one-man diving chamber 600 to 2000 feet deep in the icy Barents Sea, he said he saw cod and haddock asleep, singly and in groups, with noses pointed toward the current.

They reacted neither to diving chamber nor to the blinking of its powerful light.

Try as we might, we could not waken them up.

His evidence was supported by Dr. Evelyn Shaw, associate curator of the American Museum of Natural History in New York. She has seen trigger fish asleep, usually at night, in the museum's marine laboratory at Bimini in the Bahamas. Dr. Shaw said it was hard to awaken them even with lights and noises.

The Kingston Wig-Standard Monday, December 11 1967

# ASK THESE QUESTIONS BEFORE CHANGING YOUR JOB

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TOO MANY EXECUTIVES give more thought to buying a new boat than they do to taking a new job, says Charles E. Fox, a principal of Billington, Fox & Ellis, a Chicago-based executive recruiting firm. "What often happens," says Fox, "is that an executive hears of an attractive job opening, has lunch with a representative of the firm, visits headquarters, meets a few senior managers, asks a few obvious questions, discusses the offer with his wife, then calls to set the day he'll start work."

By taking a job after such cursory examination, says Fox, you may end up unhappy with your new employer, your new associates, your new job or all three. What should you do? Ask yourself these questions before switching, says Fox:

What do you really want from the proposed job? Security? Prestige? Income? Power? A chance for professional growth? Whatever you want, will the job really give it to you?

What does your prospective employer really expect of you? Spell this out in writing, even if you have to write the letter yourself. By getting your employer's intentions on the record, you will be helpful to everyone if memories fade.

What has your potential employer promised you? Get this in writing, too.

Have you met all the key people with whom you'll work, including associates and subordinates? Do they seem stimulating and dependable?

What is the company's executive turnover? Check past annual reports for name changes, and try to find out what happened. If necessary, ask an ex-employee.

What does the company's history suggest about its future? Is it in a competitively sound position? Is its destiny controlled by a single major customer? Is it about to merge or be acquired?

What is the company's guiding philosophy? "If it's too different from your own, you'll be miserable sooner or later," says Fox.

What are the fringe benefits? Don't overlook them just because the job itself is more important. They may total from 15% to 25% of your salary.

"If you make a thorough investigation in a tactful manner," says Fox, "you'll create a favorable impression. The company will assume you'll handle its affairs the same way."

END

# *The Most Basic Skill**

After studying the ability to handle people for two years, a Carnegie Institute of Technology team concluded that 13 per cent of a man's business success depended on his technical knowledge and 87 per cent on his skill in human relationships and his ability to lead and get along with people. This latter skill, says the report, is the most basic one for executive attainment.

So while a man with ambition toward middle management needn't be an expert in psychology, he should have some knowledge of the fundamental principles of that science and be able to analyze situations by the human factors involved. For the ability to create a climate in which people want to produce often involves all the fine arts of human relations. It is an indispensable hallmark of men at the top — and a quality that personnel men and management consultants are constantly searching for in the men they interview.

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Reprinted from Teamwork in Industry, January, 1965.

## RECHARGE THE ATMOSPHERE IN YOUR CONFERENCE ROOM

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FAR TOO MANY corporate conference rooms have a sterile atmosphere that isn't conducive to lively thinking. Their sole decorations may be blank notepads and sharpened pencils. If there are pictures on the wall, the biggest is often a likeness of the company's founder.

Not so in New York City offices of Ruder & Finn, the public relations agency. Chairman David Finn says: "We believe that a conference room should serve as a center where minds can be stimulated and refreshed by critical and sometimes contradictory thought. We believe that conference room can serve this function only if those who meet there are willing to open their minds and question assumptions that are usually taken for granted."

To help its employees do just that, Ruder & Finn had adorned the walls of its conference room with mind-opening quotations from great philosophers and religious and political leaders. Accompanying the quotations are photographs of sculpture by Rodin, Verrocchio and other greats. Each Photography has been chosen to accompany a particular quotation. Among the quotations:

From Rabbi Ben Assai: "Sit two or three places lower than the one due your position. It is better that people should ask you to move up than that they should suggest that you move down."

From Henry Ward Beecher: "There is a tonic in the things men do not like to hear."

From Dag Hammarskjold: "Only he deserves power who every day justifies it."

From St. Luke: "Woe unto you, when all men shall speak well of you."

Obviously, there's not much here to cheer the pompous, the glad-hander or the yes-man. But there is much to cheer the employee who likes to think hard and speak out.

END

## ELECTROCUTED

A hazard of television sets, in general, is that the set remains electrically "live" for some time after it has been disconnected from an outlet. The hazard of receiving a severe electrical shock is strong during the first 30 minutes after the set has been disconnected and grows less from then on, as time passes. The shock could be received from touching the prongs of the male plug after the set has been disconnected from the wall outlet.

A case is on record where a child was electrocuted by putting the male plug, of a television set cord in its mouth shortly after its mother had disconnected the set to move it.

## STAFF TRAINING

Once again we approach graduation time at the Canadian Army Staff College and the Canadian Forces Staff College. As usual a select group of RCEME Officers will graduate from each and it is to these aspiring officers the following poem is dedicated.

STAFF TRAINING

The CREME asked the CROC, one summer eve
How many copies of this do you need?
CROC's famous reply is writ in the annals,
"Write me a letter, to send through Staff Channels."

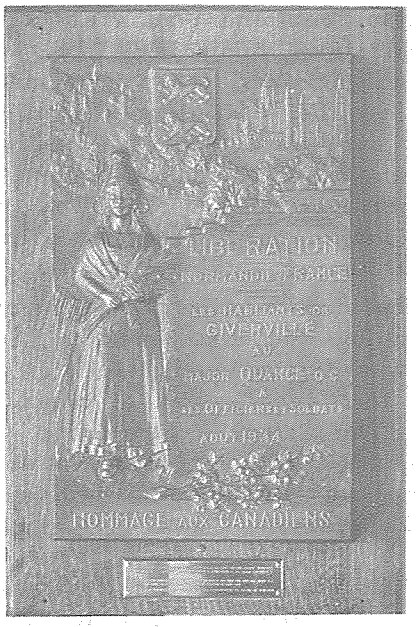
Staff didn't know. They wanted more clarity.
So they promptly asked their higher authority.
Back came the answer, referring them all
To a letter, well writ, early last fall.

So they called the Chief Clerk and drew forth the file,
And found it in detail in AHQ style.
When CROC got his answer he was duly amazed.
This was his proof, that Staff Training pays.

NYCTRA SCANDIACA

# RCEME MUSEUM

This bronze plaque is displayed in the RCEME Corps Museum located at The RCEME School, McNaughton Barracks, Kingston, Ontario.




The inscription on the small lower plaque reads:

"THIS PLAQUE WAS PRESENTED TO THE OFFICERS AND MEN OF THE FIRST CDN ARMY TROOPS WORKSHOP RCEME BY THE PEOPLE OF GIVERVILLE, NORMANDY IN APPRECIATION OF THE ALLIED LIBERATION OF NORMANDY.

THE INHABITANTS WERE ESPECIALLY GRATEFUL TO THE MEN OF THE FIRST CDN ARMY TPS WORKSHOP RCEME WHO WERE THE FIRST ALLIED TROOPS TO BE STATIONED IN THEIR TOWN.

A REPLICA OF THIS PLAQUE ALSO STANDS AT THE MAIN CROSSROADS OF THE VILLAGE OF GIVERVILLE."

Enquiries have been received by The Corps of RCEME Museum to provide a simple Will paragraph in order to donate military items to the Museum.

The office of the Judge Advocate General has been contacted and requested to provide a suitable Will paragraph.

The suggested Will paragraph is as follows:

> "I GIVE, DEVISE AND BEQUEATH all my personal military belongings (except my decorations and medals) to the Corps of The Royal Canadian Electrical and Mechanical Engineers museum, presently located at Kingston, Ontario or to such successor whose objects include the preservation of the history and tradition of the said Corps."

The maker of the Will could include the bracketed portion if he so wishes or omit it altogether and could also mention there, any other items of personal military equipment which he would not wish to include in the gift to the museum. The last phrase in the paragraph provides for the possibility that at some future time the museum as presently known, ceases to exist and in that event the gift would go to a successor carrying on similar objectives.

This Will paragraph has been prepared in a simple manner and states military belongings without definition. This is done in order that the distribution of the estate becomes as simple as possible. Of course any doubt as to claims by the beneficiary or the Museum would be awarded in favour of the principal beneficiary.

The use of this Will paragraph will ensure that your military accoutrements, clothing and equipment are retained in a RCEME Museum and thus keep your military history alive. Why not include this in your Will today or in a codicil to your Will?

# CANADIAN ARMED FORCES RESERVE COMPONENTS

25 Technical Squadron RCEME (Militia)
By Sgt J. A. Perreault

As a Centennial project, 25 Tech Sqn RCEME (M), located in Arvida Quebec, undertook a task of constructing a sportsmen shelter atop Mount Valin, the highest point in the area, 30 miles from the city. The mountain itself has a height of approximately 3,200 feet. The shelter was built at an altitude of 2,900 feet and affords a breath-taking view of the lower Saguenay, and on clear days portions of Lake St John can be seen.

The preliminary siting was done during the month of July and comprised of a few members hacking a trail up the steep incline to the summit. The trail itself approximately three miles long is negotiated by hiking through dense virgin timber, rocky slopes, marshy areas and along the edge of two lakes.

Once the site had been chosen, authority was granted by the Quebec Department of Lands and Forests to proceed with the construction of the chalet. Now the work could begin in earnest!

The first and foremost problem confronting the members of the unit, was the question of how do we build this chalet? Help was finally obtained from a local citizen residing in the village of St Fulgence - a man who was skilled in the building of log cabins.

Most of the necessary equipment and stores for the project was packed on the backs of the men and toted up the mountain. Loads varied between 10 pounds to approximately 60 pounds, and the hike to the summit lasted approximately two or three hours.

Once arrived at the site, the members pitched their tents and made themselves as comfortable as possible. Rations were drawn from CFB Bagotville and were supplemented by going to a nearby village store at least twice a week.

Trees were chopped, sawed and trimmed a distance from the site. How to get the logs there? No problem! Bring up a horse! And bring up a horse they did, toting its own bales of hay and equipment necessary to skid the logs to the site chosen to build the shelter.

Help was also obtained from CFB Bagotville. With the aid of a helicopter, the heavier equipment such as stoves, plywood sheeting, bunk beds etc, was slung underneath the helicopter in a net and deposited on the site. Because of inclement weather such as clouds, the lifts could only be accomplished about six times. When the helicopter was not available, men were again used to carry the necessary equipment up the mountain.

The construction had progressed so smoothly by the last week in August the chalet was finally completed. It measured 16 x 25 feet inside with a clear height of 8 feet. The actual construction time was two weeks. Quite an accomplishment for personnel who had never attempted this type of work before.

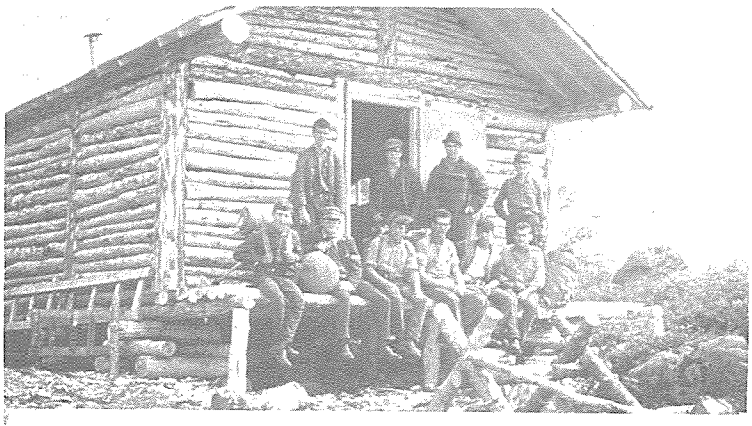
Official opening and dedication of the chalet was made on 29 October, approximately 75 people including women and children were in attendance for the ceremony. On this day the hut was turned over to a civilian committee who assumed responsibility of the chalet.

The shelter is kept opened year round to provide shelter and comfort for persons who hike or climb the mountain. This winter "ski-doo" enthusiasts made two trails in order to reach and descend the summit and throughout the winter months numerous excursions were made and the chalet was greatly appreciated both by "ski-doers" and skiers.

In the future, the chalet can serve as a base for field craft and map using training. However, its greatest merit lies in the accomplishment and future benefits to skiers, ski-doers, hikers and mountain climbers. It is truly a community project and probably the most enduring one undertaken by the Militia in Quebec Region.

CUTTING AND FITTING LOGS FOR CONSTRUCTION (ROUGH CARPENTER WORK)

VIEW OF LOWER SAGUENAY FROM CHALET UNDER CONSTRUCTION.



SEATED: Left to right
Cfn Savard, Cfn McNutt
Cfn Bergeron, L/Cpl Godin
Cfn Blackburn, Lt McLean
STANDING: L/Cpl Bradette
Cfn Conture, Cfn Lorenson
Mr. Brisson.

22 Technical Squadron RCEME (MILITIA)
Cap de la Madeleine, P.Q.

Captain Jules Cooke at 22 Technical Squadron and his seven sons, all members of the Canadian Forces. On Captain Cooke's immediate right is Michel who is a member of the Regular Force. Danny and Richard are craftsmen in 22 Technical Squadron. Four sons Gerard; Pierre, Normand and Sgt Ben are enrolled in the Cadet Services. A father and seven sons in uniform and members of the Royal Canadian Electrical and Mechanical Engineers is unique.

## SPRING OFFENSIVE OR DECEIVING THE GENERAL

Spring is here again, and accompanied by the melodious chirping of the birds amidst the new foliage the thoughts of men turn to their popular sports. The young man thinks of love, the old man of fishing, but the soldier directs his thoughts to the eternal army game; Deceiving the General; for spring is annual inspection time, and the wit must be sharpened for the forthcoming battle.

The rules of the game are very simple, but tradition has decreed them inflexible. First, of course, warning must be given of the location and time of battle. This is the tacit recognition of the superiority of the General and represents the handicap granted to the junior officer. Failure to grant such a handicap is not only considered bad form, but also reflects upon the competence of the inspecting officer, being an admission by him that the unit officers will otherwise win and that they are therefore much smarter than he.

Secondly, an exhaustive check list must be prepared and forwarded to the unit. This list details exactly all those items which the general will inspect. The experienced junior officer recognizes this for what it is, namely, a barefaced attempt at deceit designed to lull him into a feeling of false security, so that the General's attack can achieve maximum surprise and consequently a devastating victory. The General, naturally, never inspects the contents of this list, he sends his many minions to perform this mundane task in a vain attempt to carry his subterfuge to the absolute limit.

The General's check list covers every possible aspect of the unit. He ensures this is so through what is known as his Staff, who, for twelve months between inspections labour mightily perfecting and expanding it. This explains the origin of the word staff which is a modern corruption of the olde Englishe worde staffes, which comes from the Elizabethean abbreviation of Subterfuge and Trickery to Aid in Foxing and Fooling Englishe Soldiery. Having completed their check list, the General must then examine it diligently and discover an omission. This serves a dual purpose, it bolsters his ego and more important, it becomes his MPI, that is his Major Point Inexplicable.

This verbose check list is then forwarded to the unit with strict instructions that all points will be carefully examined during the forthcoming inspection. The inexperienced officer will naturally be deceived by the apparent open-handed manner in which the inspection is to be performed, and in his blissful ignorance rehearse every possible aspect of the check list. His experienced counterpart knows, however, that this is better done by the CSM leaving him free to devote his energy and perspicacity to deducing the MPI by discovering what has been left out.

Once these preliminaries have been completed, it becomes a case of every man for himself and devil take the hindmost. By a process of malicious propaganda the General tries to convince the unit that his inspection will be unique, an inspection to end all inspections. If this propaganda succeeds, and it usually does, the unit will "voluntarily" weaken itself. The night before no one will be allowed to sleep in his bed - in case the kit layout is disturbed, everyone will be rousted out at 0400 hrs - to complete last minute preparations, and all will be deprived of their breakfast - in case the kitchens get dirty. As a result the unit finds itself tired and hungry and in a poor state of morale to withstand the attack.

Meanwhile, the General prepared himself, as Generals are wont, in a manner best suited to his purpose; either by obtaining a good night's rest, a sign of a silent, flanking attack; or by disturbing his liver in a manner well practised, thereby aggravating his natural acerbity a sign of a noisy, frontal attack.

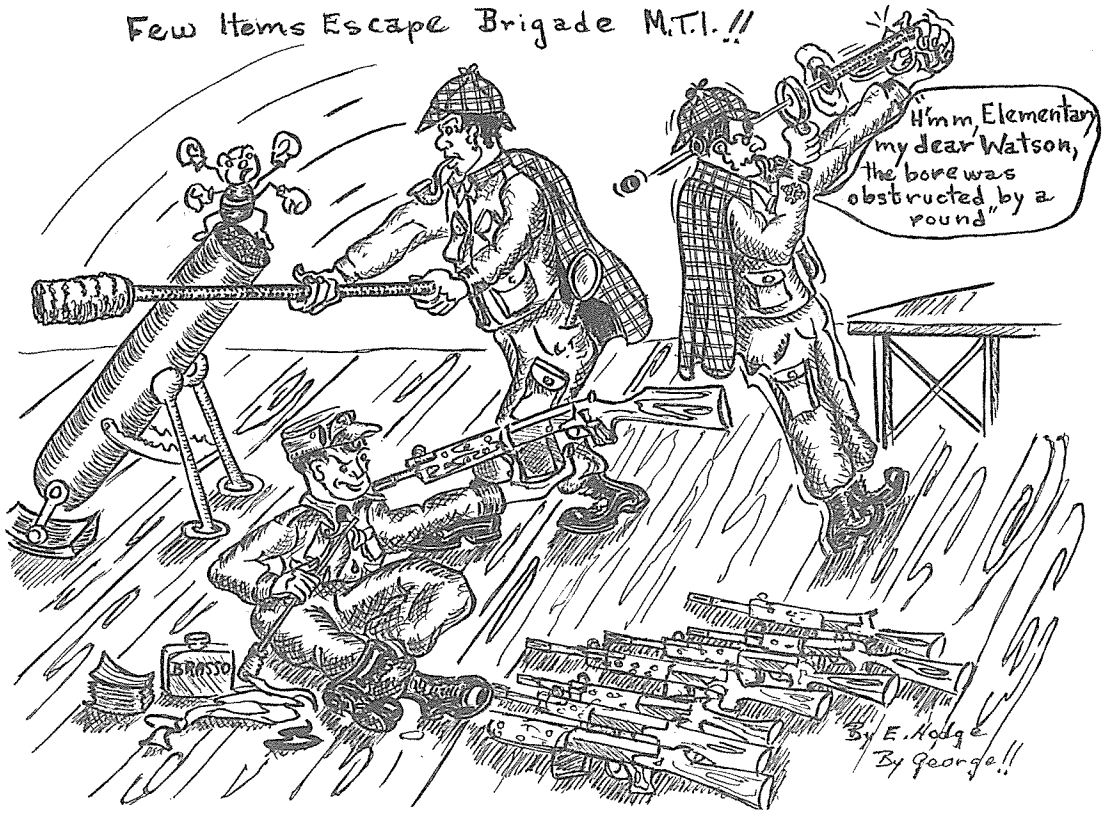
The first phase of the attack then begins by unleashing the staff officers on the unit. Their mission is to make like miniature replicas of the General, this, of

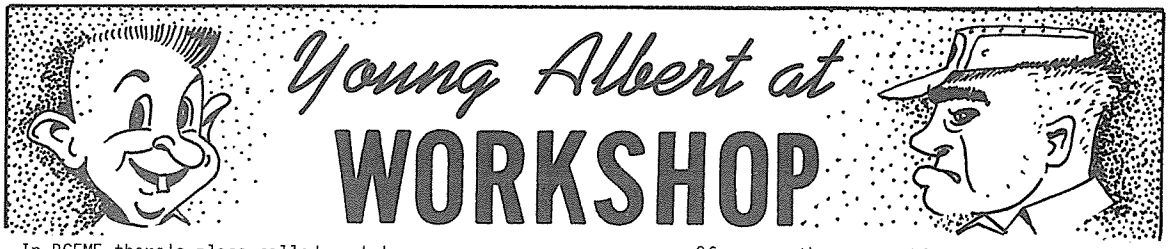
course, is natural since that is what they aspire to. Their style, however, is cramped because they are bound by the check list to which the proper answers have been well rehearsed. The failure of the staff to find fault increases their frustration proportionally to the elation of the unit officer. At the end of phase one, the unit officer, if he is inexperienced, is convinced he has finally achieved the impossible - a perfect unit.

At this point phase two commences with the arrival of the General, all suavity and smiles or crusty and caustic depending on the form of attack he plans. The former is generally recognized as the more dangerous and difficult to repulse. It generally takes the form of a few pleasantries and congratulatory remarks on the smartness of a particular sub unit, made judiciously in the hearing of all. As the conversation progresses the tension eases and the world begins to assume a rosy tint. About this time the General will pose some innocuous question. Of course, you won't know the answer and in desperation to maintain the status quo you guess. That is fatal! Immediately you find yourself enmeshed and floundering. In an effort to rescue yourself, you seize at any straw only to sink deeper and deeper into the morass. Your career has just come to an inglorious end.

The noisy frontal attack follows a similar pattern, except the crucial question denoting the MPI is usually easier to spot. It will come early in the operation accompanied by some biting remarks. If you spot it you can probably parry the thrust and by clever tactics and gamesmanship buy a little time to find the answer or call up an expert to confound the General with statistics, quotes and file references. This unfortunately simply frustrates the General who then shifts his MPI in a vain effort to vindicate his superiority. Eventually he will leave, much displeased with himself and blaming you for his ill humour.

The moral of this essay is not a warning against the danger of spring fever, nor a suggestion that inspections should be eliminated (perish the thought). Rather it is that following any inspection the best place to be is in the bar and perhaps the best person to be with is the inspecting general.






In RCEME there's place called workshop
That's noted for hard work and sweat,
An' that's where young Albert were posted
For a spot more of training to get.

Now he didn't think much on t'workshop
The place, it were dirty wi' oil
No women, no beer and no cosy chairs
A place where 'twas nowt but toil.

For in seekin' a 'T' (as in Tradespay)
And gettin' transferred to a shop,
He ad'nt considered on't work part
But found out that it meant quite a lot.

There were one great big sergeant named
'Orace
His face, it were grimy an' grim
And when he saw Albert arriving, he says
"What 'ave I done to get 'im?"

He handed Albert tool chest, fitters',
filled,
An' says, "don't get ideas about sleep
Take transmission out of yon MK5 tank
An' put crown gear in t'yon jeep.

Now Albert 'ad 'eard about sergeants
An' Orders were orders he knew,
So taking up wrench, open end
adjustable, C1
He start ont' tank to unscrew.

He managed to pry out engine alright
And tracks, and bogey wheel brackets,
The turret presented a problem at first
But a cutting torch helped to detach it.

No sign of transmission had so far turned up
But he knew it were somewhere around
And finally, 'mong stuff lying 'bout on
t'floor
Nearly seven tons of it 'e found.

To Albert, so far, the job had been easy
He were feelin' quite bucked wi' it all,
But when he came to put crown gear
(Centurion, Mark V)
Into jeep, he found it a wee bit too tall.

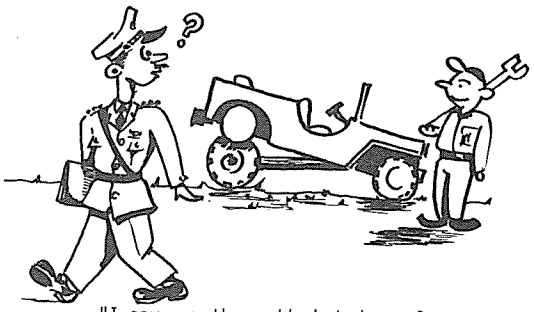
'Eer, says our Albert, the job's gettin'
tough
But 'tis problem I'll lick, aye, by gum.
He added some more words which we mustn't
print
When he dropped ruddy gear on his thumb.

He found that by cutting out hole in t'jeep
floor
And taking off Shock'sorber arm
And cutting two feet off propeller shaft,
too
The gear fitt'd in like a charm.

Of course there were bits of damn tank
still around
It looked bit untidy on t'floor,
So he swept it down drain, and plugged
damn thing up
At which sergeant got proper sore.

But when sergeant saw jeep wi' rear
wheels up in air
And running on crown gear, direct,
He says, "Albert - I've got somat for thee"
An' 'e givit 'im - right in the neck!

But strange as it seems t'were that very day
That some Brass Hats from C.F.H.Q.
Were making inspections, as per "bible"
directions,
And this fearful contraption did view.



"I say, rather odd, but damn clever,
you know",
Says the brassiest hat in the squad,
"It'll go thru' the water like Falkenburg's
daughter
Let's order a hundred odd".

"By Jove", says another, "just think of
cross country
Those teeth, they must grip like a leech
All other stuff's obsolete after this 'ere
So indent for a thousand, it's a peach".

"And look at the rubber we'll be saving,
by gum
The back wheels don't touch on the ground
Such a simple solution to tire wear and
tear -
They have nothing to do but go round".

"Who's invention is this", says Brass Hat,
No. 1,
"Well t'were nothing", says sarge, with
large grin,
As he nearly kicked hob nails out of 'is
boots
By contact wi' Albert's shin.

"I just had a notion, I were lucky I guess
To 'it nail on t' 'ead first go
Of course I don't like to take all the
credit".
At which Albert murmured "Oh, no!"

But now Sarge is sorry he spoke up so
smart
For they brought him to CFHQ, you see,
Now he's filing false dockets, and fixing
light sockets,
And Albert is workshop O.C.